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## CAPACITORS — ALPHABETICAL LISTING OF MILITARY PART NUMBERS

Military Part No.	Corning Part No.	Component Type	Page No.	Military Part No.	Corning Part No.	Component Type	Page No.
CK12	CK12	Ceramic Capacitor	28	CY08	TY08	Glass Capacitor	10
CK13	CK13	Ceramic Capacitor	28	CY10	CYFM10	Glass Capacitor	8
CK14	CK14	Ceramic Capacitor	28	CY15	CYFM15	Glass Capacitor	8
CK31	CYK01	Glass-K™ Capacitor	32	CY20	CYFM20	Glass Capacitor	8
CK32	CYK02	Glass-K™ Capacitor	32	CY30	CYFM30	Glass Capacitor	8
CKR11	CKR11	Ceramic Capacitor	26	CYR10	CYR10	Glass Capacitor	14
CKR12	CKR12	Ceramic Capacitor	26	CYR15	CYR15	Glass Capacitor	14
CKR14	CKR14	Ceramic Capacitor	26	CYR20	CYR20	Glass Capacitor	14
CKR31	CKR31	Glass-K™ Capacitor	30	CYR30	CYR30	Glass Capacitor	14
CKR32	CKR32	Glass-K™ Capacitor	30	CYR51	CYR51	Glass Capacitor	14
CY06	TY06	Glass Capacitor	10	CYR52	CYR52	Glass Capacitor	14
CY07	TY07	Glass Capacitor	10	CYR53	CYR53	Glass Capacitor	14

## CAPACITORS — MILITARY SPECIFICATION CROSS-REFERENCE

Military Specification	Military Part No.	Corning Part No.	Page No.	Military Specification	Military Part No.	Corning Part No.	Page No.
MIL-C-11015 (Ceramic Capacitors)	CK12	CK12	28	MIL-C-39014 (Established Reliability) (Ceramic Capacitors)	CKR11	CKR11	26
	CK13	CK13	28		CKR12	CKR12	26
	CK14	CK14	28		CKR14	CKR14	26
	CK31	CK31	32		CKR31	CKR31	30
	CK32	CK32	32		CKR32	CKR32	30
MIL-C-11272 (Glass Capacitors)	CY06	TY06	10	MIL-C-23269 (Established Reliability) (Glass Capacitors)	CYR10	CYR10	14
	CY07	TY07	10		CYR15	CYR15	14
	CY08	TY08	10		CYR20	CYR20	14
	CY10	CYFM10	8		CYR30	CYR30	14
	CY15	CYFM15	8		CYR51	CYR51	14
	CY20	CYFM20	8		CYR52	CYR52	14
	CY30	CYFM30	8		CYR53	CYR53	14

## CAPACITORS — ALPHABETICAL LISTING OF CORNING PART NUMBERS

Corning Part No.	Military Part No.	Component Type	Page No.	Corning Part No.	Military Part No.	Component Type	Page No.
CACZ5U	None	Ceramic Capacitor	20	MCS	None	Tantalum Capacitor	46
CACX7R	None	Ceramic Capacitor	22	MCU	None	Tantalum Capacitor	46
CACC0G	None	Ceramic Capacitor	24	MD2	None	Tantalum Capacitor	44
CK12	CK12	Ceramic Capacitor	28	MD3	None	Tantalum Capacitor	44
CK13	CK13	Ceramic Capacitor	28	MD4	None	Tantalum Capacitor	44
CK14	CK14	Ceramic Capacitor	28	MD5	None	Tantalum Capacitor	44
CKR11	CKR11	Ceramic Capacitor	26	MD6	None	Tantalum Capacitor	44
CKR12	CKR12	Ceramic Capacitor	26	MMF	None	Tantalum Capacitor	38
CKR14	CKR14	Ceramic Capacitor	26	MMJ	None	Tantalum Capacitor	38
CKR31	CKR31	Glass-K™ Capacitor	30	MML	None	Tantalum Capacitor	38
CKR32	CKR32	Glass-K™ Capacitor	30	MMM	None	Tantalum Capacitor	38
CYFM10	CY10	Glass Capacitor	8	MMS	None	Tantalum Capacitor	38
CYFM15	CY15	Glass Capacitor	8	MMU	None	Tantalum Capacitor	38
CYFM20	CY20	Glass Capacitor	8	MMW	None	Tantalum Capacitor	38
CYFM30	CY30	Glass Capacitor	8	MNA	None	Tantalum Capacitor	42
CYFR10	None	Glass Capacitor	12	MNB	None	Tantalum Capacitor	42
CYFR15	None	Glass Capacitor	12	MNF	None	Tantalum Capacitor	42
CYFR20	None	Glass Capacitor	12	MNG	None	Tantalum Capacitor	42
CYFR30	None	Glass Capacitor	12	MNL	None	Tantalum Capacitor	42
CYK01	CK31	Glass-K™ Capacitor	32	MNM	None	Tantalum Capacitor	42
CYK02	CK32	Glass-K™ Capacitor	32	MNP	None	Tantalum Capacitor	42
CYR10	CYR10	Glass Capacitor	14	MNS	None	Tantalum Capacitor	42
CYR15	CYR15	Glass Capacitor	14	MNY	None	Tantalum Capacitor	42
CYR20	CYR20	Glass Capacitor	14	MZA	None	Tantalum Capacitor	40
CYR30	CYR30	Glass Capacitor	14	MZB	None	Tantalum Capacitor	40
CYR51	CYR51	Glass Capacitor	14	MZG	None	Tantalum Capacitor	40
CYR52	CYR52	Glass Capacitor	14	MZP	None	Tantalum Capacitor	40
CYR53	CYR53	Glass Capacitor	14	MZY	None	Tantalum Capacitor	40
MCF	None	Tantalum Capacitor	46	TY06	CY06	Glass Capacitor	10
MCJ	None	Tantalum Capacitor	46	TY07	CY07	Glass Capacitor	10
MCL	None	Tantalum Capacitor	46	TY08	CY08	Glass Capacitor	10
MCM	None	Tantalum Capacitor	46				



CAPACITOR CHARACTERISTICS		DIELECTRIC TYPES											
		GLASS		GLASS-K	CERAMIC			TANTALUM					
CORNING TYPES		CYFM10-30 CYFR10-30 CYR10-30	TY06-08 CYR51-53	CK31, 32 CKR31, 32	CK12, 13, 14 CKR11, 12, 14	CAC			MINITAN MODULAR	MINITAN CORDWOOD	MINITAN NONPOLAR	MINIDIPS	CHIPS
						Z5U	X7R	C0G					
CAPACITANCE	Capacitance Range	.5 - 10,000 pF.	1 - 2400 pF.	270 - 100,000 pF.	10 to 270,000 pF	1,000 to 470,000 pF	10 to 270,000 pF	1.0 to 10,000 pF	.001 to 220 $\mu$ F.	.001 to 47 $\mu$ F.	.001 to 33 $\mu$ F.	.1 to 68 $\mu$ F.	.1 to 100 $\mu$ F.
	Standard Tolerance	$\pm 1$ to 20%	TY0 $\pm 1$ to 20% CYR $\pm 1$ to 5%	$\pm 10$ or 20%	$\pm 10$ or 20%	$\pm 20\%$ or +80, - 20%	$\pm 10$ or 20%	$\pm 1\%$ to $\pm 20\%$	$\pm 5$ to 20%	$\pm 5$ to 20%	$\pm 5$ to 20%	$\pm 10\%$ or 20%	$\pm 5\%$ to $\pm 20\%$
	Minimum Tolerance	$\pm 1\%$ or $\pm .25$ pF.	$\pm 1\%$ or $\pm .25$ pF.	$\pm 5\%$ on "T" Char. others $\pm 10\%$	$\pm 10\%$	$\pm 20\%$	$\pm 10\%$	$\pm 1\%$ or $\pm .25$ pF	$\pm 5\%$	$\pm 5\%$	$\pm 5\%$	$\pm 10\%$	$\pm 5\%$
VOLTS	DC Operating Volts	300 VDC and 500 VDC	300 VDC	50 VDC	50 VDC and 100 VDC	50 VDC and 100 VDC	50 VDC and 100 VDC	50 VDC and 100 VDC	2 to 35 VDC	2 to 50 VDC	2 to 50 VDC	2 to 35 VDC	2 to 35 VDC
	Operating Frequency	DC to VHF	DC to VHF	DC to VHF	DC to VHF	DC to VHF	DC to VHF	DC to VHF	DC to 1 MHz	DC to 1 MHz	DC to 1 MHz	DC to 1 MHz	DC to 1 MHz
DISSIPATION FACTOR	% @ 120 Hz.								6 to 15%	6 to 10%	6 to 10%	8 to 10%	6 to 10%
	% @ 1 KHz.	.1% @ 25°C.	.1% > 100 pF. .2% < 100 pF.	1 to 3%	2.5% Max.	3.0% Max.	2.5% Max.	.1% Max.					
INSULATION RESISTANCE	Meg $\Omega$	100,000 @ 25°C.	100,000 @ 25°C.	100,000 Meg $\Omega$ or 1000 M $\Omega$ - $\mu$ F. whichever is less	100,000 Meg $\Omega$ or 1000 M $\Omega$ - $\mu$ F. whichever is less	10,000 Meg $\Omega$ or 100 M $\Omega$ - $\mu$ F. whichever is less	100,000 Meg $\Omega$ or 1000 M $\Omega$ - $\mu$ F. whichever is less	100,000 Meg $\Omega$ or 1000 M $\Omega$ - $\mu$ F. whichever is less	Seldom Used	Seldom Used	Seldom Used	Seldom Used	Seldom Used
	M $\Omega$ - $\mu$ F.												
TEMPERATURE	Operating Range	- 55°C. to + 125°C.	- 55°C. to + 125°C.	- 55°C. to + 125°C.	- 55°C. to + 125°C.	+ 10°C to + 85°C	- 55°C to + 125°C	- 55°C to + 125°C	- 55°C. to + 125°C.	- 55°C. to + 125°C.	- 55°C. to + 125°C.	- 55°C. to + 85°C.	- 55°C. to + 125°C.
	Temperature Characteristic	+140 $\pm$ 25 PPM / °C	+140 $\pm$ 25 PPM / °C	+2, - 10 or +2, - 15 or +20, 45	$\pm 15\%$ BX and BR	+22, - 56%	$\pm 15\%$	0 $\pm$ 30PPM/°C	Seldom Used	Seldom Used	Seldom Used	Seldom Used	Seldom Used
PHYSICAL CHARACTERISTICS	Volumetric Efficiency	Low	Low	Moderate	Moderate	High	Moderate	Moderate	Very High	Very High	High	High	High
	Lead Type	Axial	Radial	Axial	Axial	Axial	Axial	Axial	Axial and Radial	Axial and Radial	Axial and Radial	Radial	None (Chip)
RELATIVE COST FOR EQUIVALENT CV RATING		High	High	Moderate	Moderate	Low	Low	Moderate	Moderate	Moderate	Moderate	Low	Low
MIL-SPECS MIL-C-		11272 and 23269	11272 and 23269	CK31, 32 (11015/25) CKR31, 32 (39014/21)	CK12, 13, 14 (11015/20) CKR11, 12, 14 (39014/5)	None			Tested to MIL-C-55365		None		
CATALOG PAGE NUMBERS		8, 12, 14	10, 14	30, 32	26, 28	20	22	24	38	40	42	44	46



# Introduction to CORNING Glass Capacitors

CORNING

## The first material used as a capacitor was glass in a Leyden jar back in 1745!

As capacitors have evolved from the Leyden jar into the products of today, glass has remained the most dependable dielectric known. The reasons are simple — when specifying a capacitor you look for a dielectric material that's durable and reproducible; one with good insulating properties, high dielectric strength, low power factor, high volume and surface resistivity, controlled expansion coefficients, high thermal strength, high insulation resistance, and a good dielectric constant. Glass has all of these.

Corning has developed a method to formulate ideal dielectric glasses for varied applications. Properties of these glasses are precisely controlled on a continuous basis as the glass is rolled into ribbon form. It is this resultant ribbon of glass that has made mass production of glass capacitors practical as well as economical. Because there is no chance of "batch" variation in the continuous operation, you get the same high reliability in CORNING® capacitors from part to part, week to week, month to month, and year to year.

The CORNING Glass Capacitor gives you performance that exceeds today's most rigorous load-life requirements, not to mention rigid high frequency applications. The electrical ultrastability of the fused glass and foil capacitive element is frozen in glass in a special sealing process. True glass-to-metal sealing at the leads makes them virtually indestructible under environmental stresses.

## The right Glass Capacitor for your applications

CORNING® CYFM Capacitors give you environment-proof performance at substantial savings. They provide economical stability and reliability in coupling, decoupling, filtering, timing, switching, and many other critical circuits. The CYFMs are electrically and environmentally interchangeable with the CYFR type. We have boiled them in salt water, immersed them in saturated steam and subjected them to

## What the CORNING® Glass Capacitor can do for you

**Stability and Durability** — This rugged glass capacitor is practically immune to environment, temperature, time, voltage, moisture, frequency, vibration, and shock — to name just a few. This means hours and days can be saved in *worst-case* design. It means circuit sophistication previously not attainable. It means reliability of the highest order. Tuned circuits stay tuned, RC time constants stay constant, coupled circuits stay coupled, decoupled circuits stay decoupled, and phase shifters stay fixed.

**Predictability** — Every CORNING glass capacitor performs exactly like every other CORNING glass capacitor. From day to day, year to year, performance is identical because of total control in manufacturing the dielectric. Materials and process are foremost in producing a quality capacitor. Corning uses optical quality glass in the dielectric that lasts forever and fuses aluminum foil plates and Dumet leads into it. Because of the resulting monolithic structure, very few materials are needed — only important ones. Materials and processes going into all CORNING glass capacitors are the same as those used on our Minuteman capacitors.

**Versatility** — There are practically no applications which cannot be improved by using a CORNING glass capacitor assuming size and capacitance values are compatible. Glass capacitors come close to being a "perfect circuit symbol".

**Construction** — Three elements: glass dielectric and case, aluminum electrodes,

wire terminals. What can go wrong? No radiation problems, no fungus, no storage problems, no melting wax, no solder to melt or crystallize, no seals to fail, no problems with vacuum, no pressure problems, no metallizing to come loose, no capacitance "jumps" — plates are "frozen" in glass, no electrolyte to leak, nothing to burn, nothing to dissolve.

**Extremely Low Losses** — Means higher Q and narrower bandwidths in your filters and tuned circuits. It also means you can use this small capacitor to handle appreciable RF currents. If you need low loss circuits, you need CORNING capacitors.

**Retractable TC** — Capacitance is always exactly where you expect it to be — absolutely no hysteresis during temperature cycling and every unit is identical in characteristics.

**Weldable Leads** — Dumet type are standard. They can be soldered or welded. (That simplifies purchasing.)

### When to Use a Glass Capacitor

- When *reliability* is critical and replacement of a failed part is neither possible nor practicable.
- When *stability* is requisite, even in severe environments.
- Where *economy* through worst-case design is sought.
- Where *economy* through possible elimination of trimming is sought.
- Where *economy* of maintenance is sought.
- Where your *customer's satisfaction* is paramount.

96-hour salt spray and 1200 hours of moisture resistance tests without failure or degradation.

CORNING® TYO Capacitors are ideal for printed circuit applications because of their miniaturization and radial lead configuration. Their design permits upright, flush mounting on circuit boards. Standard gold plated Dumet leads give reliable soldering or welding, and are spaced symmetrically with the case on .1" grids for fast installation on printed circuit boards. The lower prices of CORNING TYO Capacitors now provide a glass capacitor at comparable ceramic prices.

CORNING® CYFR Capacitors give you guaranteed reliability. They have contri-

buted, and continue to contribute to marked improvement in MTBF in many military and space programs such as Titan, Surveyor, Syncom, Mariner, Apollo, and Gemini. Over 64-million unit-hours from lot acceptance tests over a five year period for Minuteman have demonstrated the reliability and reproducibility of the CYFR capacitor from a process under control.

CORNING® CYR Capacitors are the established reliability versions of our CYFM/CY and TYO/CYO series in accordance with MIL-C-23269. They are built to the same exacting standards of performance with the added plus of an established reliability rating. They are ideal for military programs and industrial applications where component failure cannot be tolerated.



## GLASS CAPACITORS

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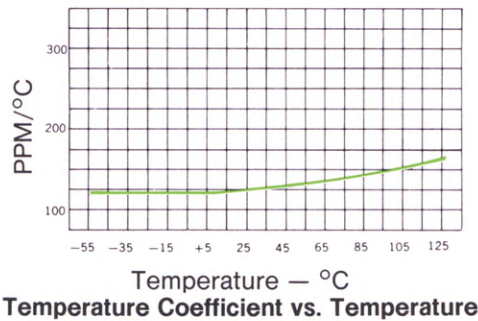
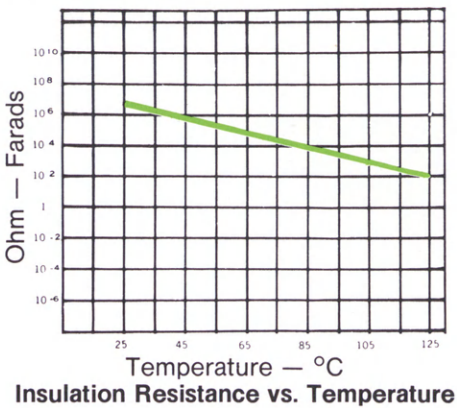
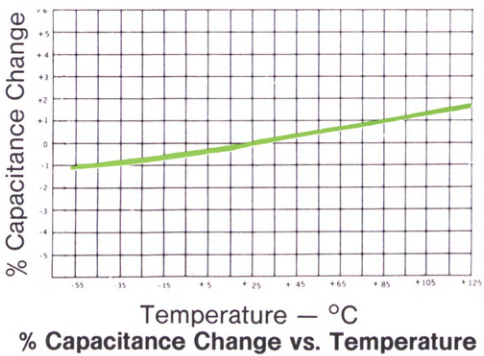
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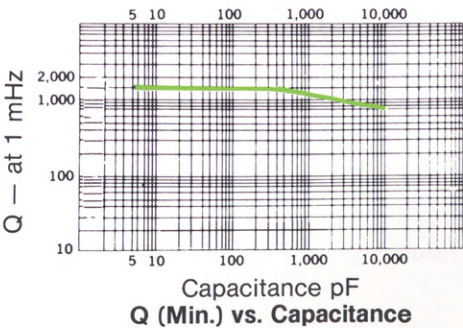
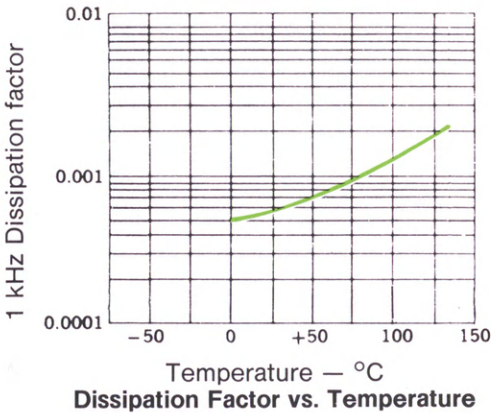
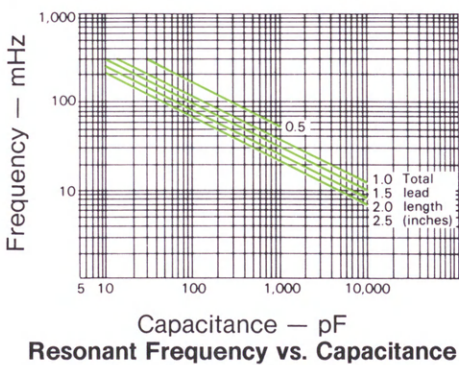
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Performance curves for all Glass Capacitors

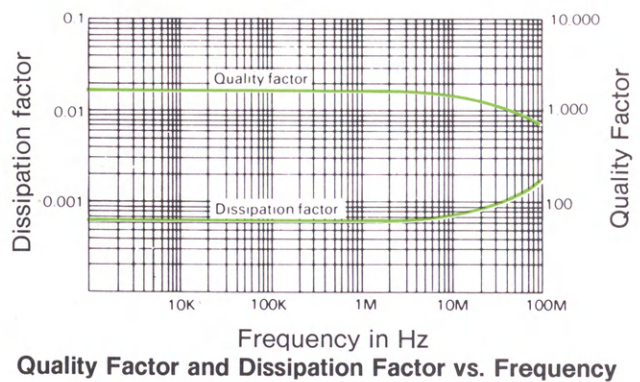
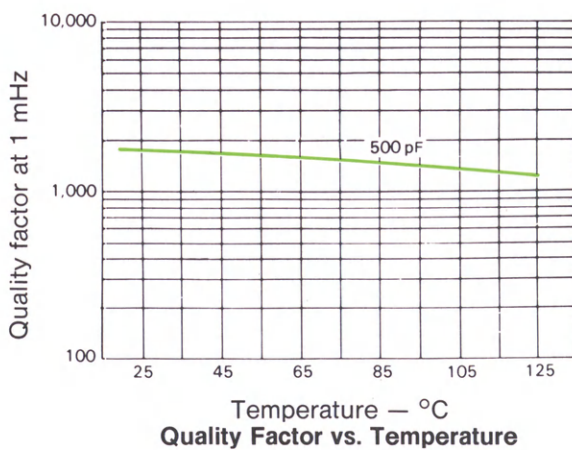
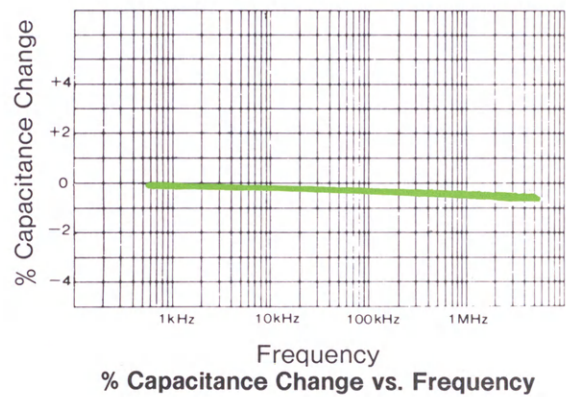
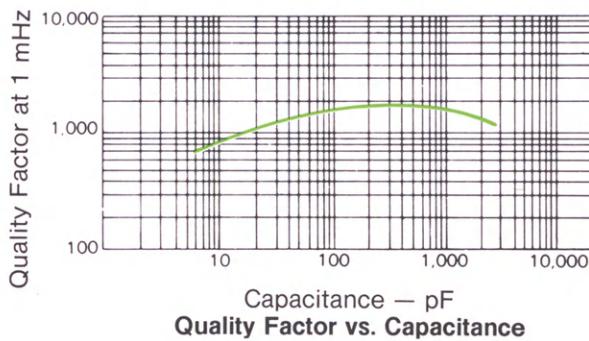
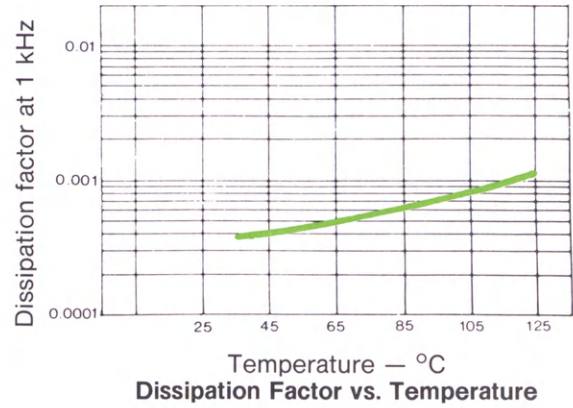
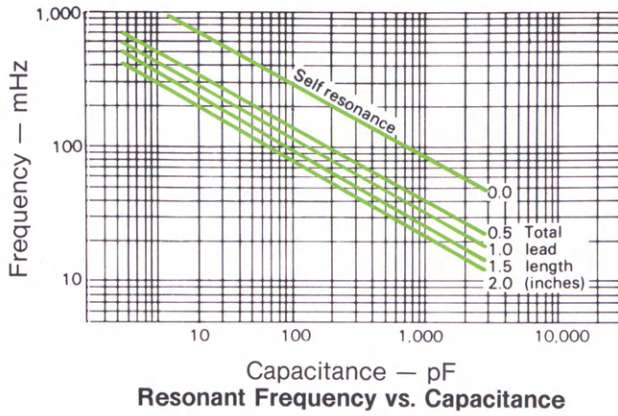


Performance curves for CYFR, CYFM, Axial CY, CYR Capacitors





## Performance curves for TYO, Radial CY and CYR Capacitors





# Glass Capacitors

CORNING

CY10, 15, 20, 30 (QPL to MIL-C-11272)  
CYFM10, 15, 20, 30 (INDUSTRIAL)

## APPLICATIONS

These extremely stable glass capacitors, CORNING® style CYFM, meet or exceed all requirements of MIL-C-11272. With glass dielectric, fused monolithic construction and true glass-to-metal seals at the leads, they have very low losses and are virtually immune to severe environmental stresses.

## PERFORMANCE CHARACTERISTICS

**Tolerance** — Available tolerances for each value of capacitance are shown in the ordering information table. For codes, refer to the Part Numbers paragraph.

**Temperature Coefficient** —  $+140 \pm 25$  ppm/°C at 100 kHz. TC will track and retrace to within  $\pm 5$  ppm. Capacitance drift is less than 0.1% or 0.1 pF whichever is greater.

**Voltage Coefficient** — zero

**Losses** — Extremely low, and remain relatively low at elevated temperatures. Dissipation factor is not more than 0.001 at 1.0 kHz and 25°C.

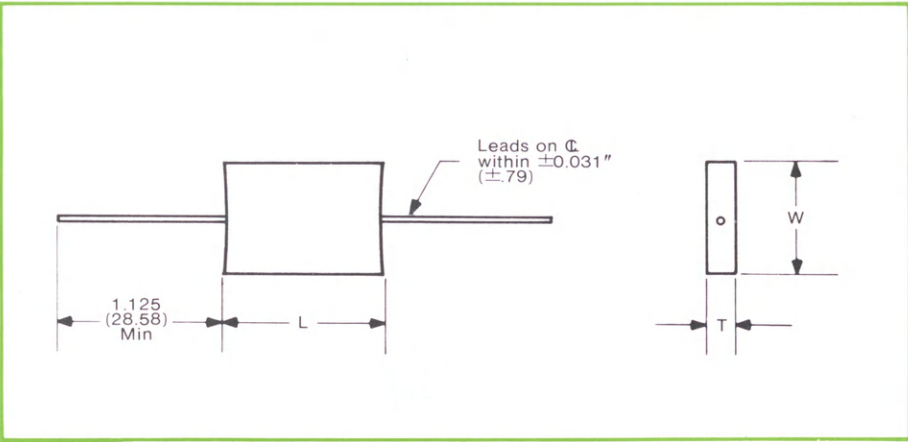
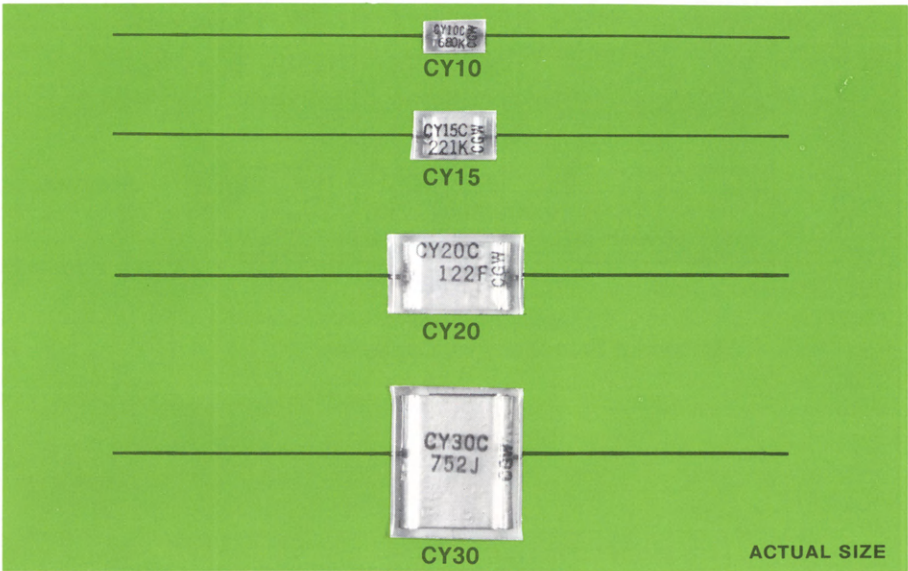
**Life** — After 2,000 hours at 125°C with 150% of rated voltage applied, capacitance change is less than 0.5% or 0.5 pF whichever is greater.

**Insulation Resistance** — Greater than 100,000 megohms at 25°C; greater than 10,000 megohms at 125°C.

**Voltage/Temperature Ratings** — Voltage ratings are shown in the ordering information table. The operating temperature range is  $-55^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$  with no derating required.

**Moisture Resistance** — Meets or exceeds all requirements of MIL-C-11272 and MIL-STD-202, Method 106.

**Part Numbers** — Basic part numbers are shown in the ordering information table. Add the appropriate suffix to specify tolerance. Suffix codes: "C" =  $\pm 0.25\text{pF}$ , "D" =  $\pm 0.5\text{pF}$ , "F" =  $\pm 1\%$ , "G" =  $\pm 2\%$ , "J" =  $\pm 5\%$ , "K" =  $\pm 10\%$ , "M" =  $\pm 20\%$ .



Dimensions — Inches (Millimeters)					
Style	L Min — Max		W Min — Max		Lead Dia
CY10	.2969 — .3906 (7.54 — 9.93)		.1406 — .2031 (3.58 — 5.16)		.020 24 AWG (.51)
CY15	.4219 — .5156 (10.72 — 13.11)		.2344 — .2968 (5.94 — 7.54)		.020 24 AWG (.51)
CY20	.6719 — .7968 (17.07 — 20.24)		.3750 — .4687 (9.52 — 11.91)		.025 22 AWG (.63)
CY30	.7032 — .8281 (17.86 — 21.03)		.6719 — .8281 (17.07 — 21.03)		.025 22 AWG (.63)
					Weight (Grams)
					.25 — .50
					.75 — 1.25
					2.50 — 4.00
					5.00 — 7.00

**Note:** Leads are solder coated Dumet.



## PART NUMBERS AND ORDERING INFORMATION

Capacitance Value (pF)	Military Type Designation	Corning Part No.	DC Working Voltage	Tolerances Available	Capacitance Value (pF)	Military Type Designation	Corning Part No.	DC Working Voltage	Tolerances Available
<b>STANDARD VALUES CYFM-10</b>					<b>STANDARD VALUES CYFM-15</b>				
0.5	CY10C0R5 *	CYFM10C0R5 *	500	C	220	CY15C221 *	CYFM15C221 *	500	F,G,J,K,M
1.0	CY10C010	CYFM10C010	500	C,D	240	CY15C241	CYFM15C241	500	F,G,J,K,M
1.5	CY10C1R5	CYFM10C1R5	500	C,D	270	CY15C271	CYFM15C271	500	F,G,J,K,M
2.2	CY10C2R2	CYFM10C2R2	500	C,D	300	CY15C301	CYFM15C301	500	F,G,J,K,M
2.7	CY10C2R7	CYFM10C2R7	500	C,D	330	CY15C331	CYFM15C331	500	F,G,J,K,M
3.0	CY10C030	CYFM10C030	500	C,D	360	CY15C361	CYFM15C361	500	F,G,J,K,M
3.3	CY10C3R3	CYFM10C3R3	500	C,D	390	CY15C391	CYFM15C391	500	F,G,J,K,M
3.6	CY10C3R6	CYFM10C3R6	500	C,D	430	CY15C431	CYFM15C431	500	F,G,J,K,M
3.9	CY10C3R9	CYFM10C3R9	500	C,D	470	CY15C471	CYFM15C471	500	F,G,J,K,M
4.3	CY10C4R3	CYFM10C4R3	500	C,D	510	CY15C511	CYFM15C511	500	F,G,J,K,M
4.7	CY10C4R7	CYFM10C4R7	500	C,K	560	CY15C561	CYFM15C561	300	F,G,J,K,M
5.1	CY10C5R1	CYFM10C5R1	500	C,J,K	620	CY15C621	CYFM15C621	300	F,G,J,K,M
5.6	CY10C5R6	CYFM10C5R6	500	C,J,K	680	CY15C681	CYFM15C681	300	F,G,J,K,M
6.2	CY10C6R2	CYFM10C6R2	500	C,J,K	750	CY15C751	CYFM15C751	300	F,G,J,K,M
6.8	CY10C6R8	CYFM10C6R8	500	C,J,K	820	CY15C821	CYFM15C821	300	F,G,J,K,M
7.5	CY10C7R5	CYFM10C7R5	500	C,J,K	910	CY15C911	CYFM15C911	300	F,G,J,K,M
8.2	CY10C8R2	CYFM10C8R2	500	C,J,K	1000	CY15C102	CYFM15C102	300	F,G,J,K,M
9.1	CY10C9R1	CYFM10C9R1	500	C,J,K	1100	CY15C112	CYFM15C112	300	F,G,J,K,M
10	CY10C100	CYFM10C100	500	C,J,K,M	1200	CY15C122	CYFM15C122	300	F,G,J,K,M
11	CY10C110	CYFM10C110	500	C,J,K,M	<b>STANDARD VALUES CYFM-20</b>				
12	CY10C120	CYFM10C120	500	C,J,K,M	560	CY20C561 *	CYFM20C561 *	500	F,G,J,K,M
13	CY10C130	CYFM10C130	500	C,G,J,K,M	620	CY20C621	CYFM20C621	500	F,G,J,K,M
15	CY10C150	CYFM10C150	500	C,G,J,K,M	680	CY20C681	CYFM20C681	500	F,G,J,K,M
16	CY10C160	CYFM10C160	500	C,G,J,K,M	750	CY20C751	CYFM20C751	500	F,G,J,K,M
18	CY10C180	CYFM10C180	500	C,G,J,K,M	820	CY20C821	CYFM20C821	500	F,G,J,K,M
20	CY10C200	CYFM10C200	500	C,G,J,K,M	910	CY20C911	CYFM20C911	500	F,G,J,K,M
22	CY10C220	CYFM10C220	500	C,G,J,K,M	1000	CY20C102	CYFM20C102	500	F,G,J,K,M
24	CY10C240	CYFM10C240	500	C,G,J,K,M	1100	CY20C112	CYFM20C112	500	F,G,J,K,M
27	CY10C270	CYFM10C270	500	F,G,J,K,M	1200	CY20C122	CYFM20C122	500	F,G,J,K,M
30	CY10C300	CYFM10C300	500	F,G,J,K,M	1300	CY20C132	CYFM20C132	500	F,G,J,K,M
33	CY10C330	CYFM10C330	500	F,G,J,K,M	1500	CY20C152	CYFM20C152	500	F,G,J,K,M
36	CY10C360	CYFM10C360	500	F,G,J,K,M	1600	CY20C162	CYFM20C162	500	F,G,J,K,M
39	CY10C390	CYFM10C390	500	F,G,J,K,M	1800	CY20C182	CYFM20C182	500	F,G,J,K,M
43	CY10C430	CYFM10C430	500	F,G,J,K,M	2000	CY20C202	CYFM20C202	500	F,G,J,K,M
47	CY10C470	CYFM10C470	500	F,G,J,K,M	2200	CY20C222	CYFM20C222	500	F,G,J,K,M
51	CY10C510	CYFM10C510	500	F,G,J,K,M	2400	CY20C242	CYFM20C242	500	F,G,J,K,M
56	CY10C560	CYFM10C560	500	F,G,J,K,M	2700	CY20C272	CYFM20C272	500	F,G,J,K,M
62	CY10C620	CYFM10C620	500	F,G,J,K,M	3000	CY20C302	CYFM20C302	500	F,G,J,K,M
68	CY10C680	CYFM10C680	500	F,G,J,K,M	3300	CY20C332	CYFM20C332	500	F,G,J,K,M
75	CY10C750	CYFM10C750	500	F,G,J,K,M	3600	CY20C362	CYFM20C362	300	F,G,J,K,M
82	CY10C820	CYFM10C820	500	F,G,J,K,M	3900	CY20C392	CYFM20C392	300	F,G,J,K,M
91	CY10C910	CYFM10C910	500	F,G,J,K,M	4300	CY20C432	CYFM20C432	300	F,G,J,K,M
100	CY10C101	CYFM10C101	500	F,G,J,K,M	4700	CY20C472	CYFM20C472	300	F,G,J,K,M
110	CY10C111	CYFM10C111	500	F,G,J,K,M	5100	CY20C512	CYFM20C512	300	F,G,J,K,M
120	CY10C121	CYFM10C121	500	F,G,J,K,M	<b>STANDARD VALUES CYFM-30</b>				
130	CY10C131	CYFM10C131	500	F,G,J,K,M	3600	CY30C362 *	CYFM30C362 *	500	F,G,J,K,M
150	CY10C151	CYFM10C151	500	F,G,J,K,M	3900	CY30C392	CYFM30C392	500	F,G,J,K,M
160	CY10C161	CYFM10C161	500	F,G,J,K,M	4300	CY30C432	CYFM30C432	500	F,G,J,K,M
180	CY10C181	CYFM10C181	500	F,G,J,K,M	4700	CY30C472	CYFM30C472	500	F,G,J,K,M
200	CY10C201	CYFM10C201	500	F,G,J,K,M	5100	CY30C512	CYFM30C512	500	F,G,J,K,M
220	CY10C221	CYFM10C221	300	F,G,J,K,M	5600	CY30C562	CYFM30C562	500	F,G,J,K,M
240	CY10C241	CYFM10C241	300	F,G,J,K,M	6200	CY30C622	CYFM30C622	500	F,G,J,K,M
270	CY10C271	CYFM10C271	300	F,G,J,K,M	6800	CY30C682	CYFM30C682	300	F,G,J,K,M
300	CY10C301	CYFM10C301	300	F,G,J,K,M	7500	CY30C752	CYFM30C752	300	F,G,J,K,M
*Add letter for tolerance code above lines.					8200	CY30C822	CYFM30C822	300	F,G,J,K,M
					9100	CY30C912	CYFM30C912	300	F,G,J,K,M
					10000	CY30C103	CYFM30C103	300	F,G,J,K,M

CERAMIC/GLASS-K™  
CAPACITORS

SOLID TANTALUM  
CAPACITORS

METAL FILM  
RESISTORS

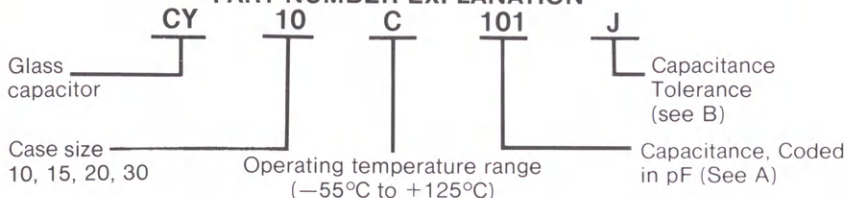
PACKAGING

### PART MARKING



CY — Glass Capacitor  
10 — Case Size  
C — Operating Temperature Range  
101 — Capacitance, Coded in pF  
J — Tolerance  
CGW — Corning Glass Works

### PART NUMBER EXPLANATION



A. Capacitance Code is expressed in picofarads (pF). The first two digits represent significant figures and the third digit specifies the number of zeros to follow; i.e. 101 indicates 100 pF. For fractional values below 10pF, R = decimal point; i.e. 1R5 indicates 1.5 pF.

#### B. Tolerance Code:

C = ±.25 pF    F = ±1%    J = ± 5%  
D = ±.50 pF    G = ±2%    K = ±10%  
M = ±20%



# Glass Capacitors



CY06, 07, 08 (QPL to MIL-C-11272)  
TY06, 07, 08 (INDUSTRIAL)

### APPLICATIONS

These precision miniature glass capacitors, CORNING® style TY0, meet or exceed all requirements of MIL-C-11272. Constructed of a fused monolithic capacitive element in a rectangular case with gold-plated radial Dumet leads, this series permits high packaging efficiency for printed circuit applications where extremely stable, low-loss capacitors are required.

### PERFORMANCE CHARACTERISTICS

**Tolerance** — Available tolerances are “C” =  $\pm 0.25\text{pF}$ , “D” =  $\pm 0.5\text{pF}$ , “F” =  $\pm 1\%$ , “G” =  $\pm 2\%$ , “J” =  $\pm 5\%$ , “K” =  $\pm 10\%$ , and “M” =  $\pm 20\%$  as shown in the ordering information table. Standard tolerance for 5.1pF and above is  $\pm 5\%$ , below 5.1pF the standard tolerance is  $\pm 0.25\text{pF}$ .

**Temperature Coefficient** —  $+140 \pm 25 \text{ ppm}/^\circ\text{C}$  at 100 kHz. TC will track and retrace to within  $\pm 5 \text{ ppm}$ . Capacitance drift is less than 0.1% or 0.1 pF, whichever is greater.

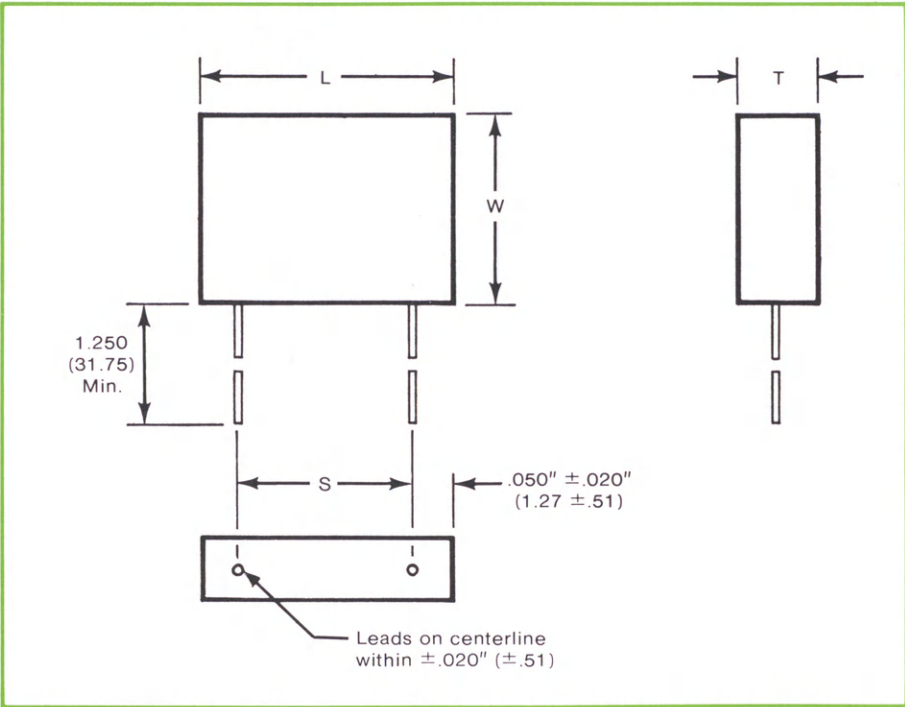
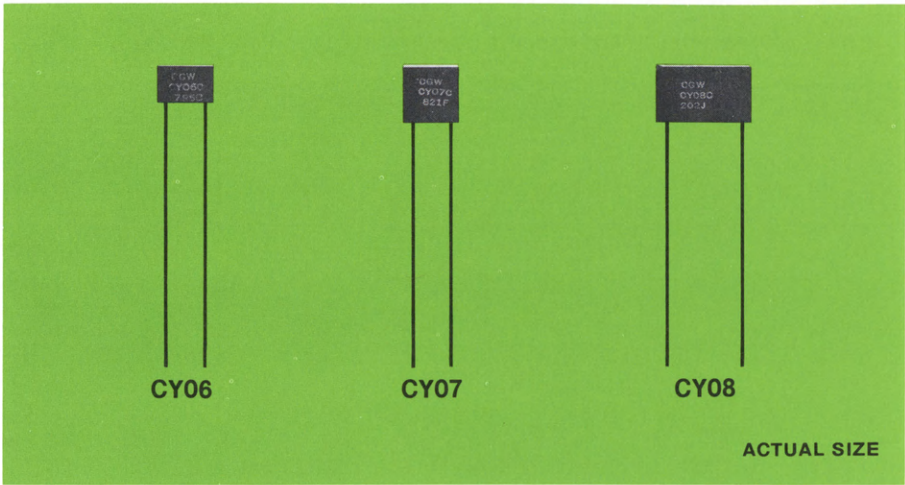
**Voltage Coefficient** — Zero.

**Losses** — Extremely low, and remain relatively low at elevated temperatures. Dissipation factor at 1 kHz and  $25^\circ\text{C}$  is less than 0.001 for values greater than 100 pF and less than 0.002 for values of 100 pF and below.

**Life** — After 2,000 hours at  $125^\circ\text{C}$  with 150% of rated voltage applied, capacitance change is less than 0.5% or 0.5 pF; dissipation factor is less than 0.0025 for values above 100 pF and less than 0.0045 for values of 100 pF and below; insulation resistance is greater than 100,000 megohms.

**Insulation Resistance** — Greater than 100,000 megohms at  $25^\circ\text{C}$ ; greater than 10,000 megohms at  $125^\circ\text{C}$ .

**Voltage/Temperature Rating** — 300 WVDC over the temperature range of  $-55^\circ\text{C}$  to  $+125^\circ\text{C}$  with no derating required.



Dimensions — Inches (Millimeters)					
Case Size	L $\pm .005$ ( $\pm .13$ )	W $\pm .010$ ( $\pm .25$ )	T $\pm .005$ ( $\pm .13$ )	S $\pm .020$ ( $\pm .51$ )	Weight (Grams)
CY06	.300 (7.62)	.200 (5.08)	.115 (2.92)	.200 (5.08)	.3 — .4
CY07	.300 (7.62)	.300 (7.62)	.115 (2.92)	.200 (5.08)	.4 — .5
CY08	.500 (12.70)	.300 (7.62)	.115 (2.92)	.400 (10.16)	.7 — .8

**Note:** All leads are 24 AWG,  $.020 \pm .002$  ( $.51 \pm .05$ ) diameter. Leads are solderable and weldable gold-plated Dumet, per MIL-STD-1276, Type D.

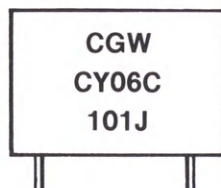


## PART NUMBERS AND ORDERING INFORMATION

Capacitance Value (pF)					DC Working Voltage					Capacitance Value (pF)					DC Working Voltage				
Military Type Designation		Corning Part No.		Tolerances Available		Military Type Designation		Corning Part No.		Tolerances Available		Military Type Designation		Corning Part No.		Tolerances Available			
STANDARD VALUES CY06										STANDARD VALUES CY06									
1.0	CY06C010	*	TY06C010	*	300	C,D	91	CY06C910	*	TY06C910	*	300	F,G,J,K,M						
1.5	CY06C1R5	—	TY06C1R5	—	300	C,D	100	CY06C101	—	TY06C101	—	300	F,G,J,K,M						
2.2	CY06C2R2	—	TY06C2R2	—	300	C,D	110	CY06C111	—	TY06C111	—	300	F,G,J,K,M						
2.7	CY06C2R7	—	TY06C2R7	—	300	C,D	120	CY06C121	—	TY06C121	—	300	F,G,J,K,M						
3.0	CY06C030	—	TY06C030	—	300	C,D	130	CY06C131	—	TY06C131	—	300	F,G,J,K,M						
3.3	CY06C3R3	—	TY06C3R3	—	300	C,D	150	CY06C151	—	TY06C151	—	300	F,G,J,K,M						
3.6	CY06C3R6	—	TY06C3R6	—	300	C,D	160	CY06C161	—	TY06C161	—	300	F,G,J,K,M						
3.9	CY06C3R9	—	TY06C3R9	—	300	C,D	180	CY06C181	—	TY06C181	—	300	F,G,J,K,M						
4.3	CY06C4R3	—	TY06C4R3	—	300	C,D	200	CY06C201	—	TY06C201	—	300	F,G,J,K,M						
4.7	CY06C4R7	—	TY06C4R7	—	300	C,K	220	CY06C221	—	TY06C221	—	300	F,G,J,K,M						
5.1	CY06C5R1	—	TY06C5R1	—	300	C,J,K	240	CY06C241	—	TY06C241	—	300	F,G,J,K,M						
5.6	CY06C5R6	—	TY06C5R6	—	300	C,J,K	270	CY06C271	—	TY06C271	—	300	F,G,J,K,M						
6.2	CY06C6R2	—	TY06C6R2	—	300	C,J,K	300	CY06C301	—	TY06C301	—	300	F,G,J,K,M						
6.8	CY06C6R8	—	TY06C6R8	—	300	C,J,K	330	CY06C331	—	TY06C331	—	300	F,G,J,K,M						
7.5	CY06C7R5	—	TY06C7R5	—	300	C,J,K	360	CY06C361	—	TY06C361	—	300	F,G,J,K,M						
8.2	CY06C8R2	—	TY06C8R2	—	300	C,J,K	390	CY06C391	—	TY06C391	—	300	F,G,J,K,M						
9.1	CY06C9R1	—	TY06C9R1	—	300	C,J,K	430	CY06C431	—	TY06C431	—	300	F,G,J,K,M						
10	CY06C100	—	TY06C100	—	300	C,J,K,M	470	CY06C471	—	TY06C471	—	300	F,G,J,K,M						
11	CY06C110	—	TY06C110	—	300	C,J,K,M	510	CY06C511	—	TY06C511	—	300	F,G,J,K,M						
12	CY06C120	—	TY06C120	—	300	C,J,K,M	560	CY06C561	—	TY06C561	—	300	F,G,J,K,M						
13	CY06C130	—	TY06C130	—	300	C,G,J,K,M	STANDARD VALUES CY07												
15	CY06C150	—	TY06C150	—	300	C,G,J,K,M	620	CY07C621	*	TY07C621	*	300	F,G,J,K,M						
16	CY06C160	—	TY06C160	—	300	C,G,J,K,M	680	CY07C681	—	TY07C681	—	300	F,G,J,K,M						
18	CY06C180	—	TY06C180	—	300	C,G,J,K,M	750	CY07C751	—	TY07C751	—	300	F,G,J,K,M						
20	CY06C200	—	TY06C200	—	300	C,G,J,K,M	820	CY07C821	—	TY07C821	—	300	F,G,J,K,M						
22	CY06C220	—	TY06C220	—	300	C,G,J,K,M	910	CY07C911	—	TY07C911	—	300	F,G,J,K,M						
24	CY06C240	—	TY06C240	—	300	C,G,J,K,M	1000	CY07C102	—	TY07C102	—	300	F,G,J,K,M						
27	CY06C270	—	TY06C270	—	300	F,G,J,K,M	STANDARD VALUES CY08												
30	CY06C300	—	TY06C300	—	300	F,G,J,K,M	1100	CY08C112	*	TY08C112	*	300	F,G,J,K,M						
33	CY06C330	—	TY06C330	—	300	F,G,J,K,M	1200	CY08C122	—	TY08C122	—	300	F,G,J,K,M						
36	CY06C360	—	TY06C360	—	300	F,G,J,K,M	1300	CY08C132	—	TY08C132	—	300	F,G,J,K,M						
39	CY06C390	—	TY06C390	—	300	F,G,J,K,M	1500	CY08C152	—	TY08C152	—	300	F,G,J,K,M						
43	CY06C430	—	TY06C430	—	300	F,G,J,K,M	1600	CY08C162	—	TY08C162	—	300	F,G,J,K,M						
47	CY06C470	—	TY06C470	—	300	F,G,J,K,M	1800	CY08C182	—	TY08C182	—	300	F,G,J,K,M						
51	CY06C510	—	TY06C510	—	300	F,G,J,K,M	2000	CY08C202	—	TY08C202	—	300	F,G,J,K,M						
56	CY06C560	—	TY06C560	—	300	F,G,J,K,M	2200	CY08C222	—	TY08C222	—	300	F,G,J,K,M						
62	CY06C620	—	TY06C620	—	300	F,G,J,K,M	2400	CY08C242	—	TY08C242	—	300	F,G,J,K,M						
68	CY06C680	—	TY06C680	—	300	F,G,J,K,M													
75	CY06C750	—	TY06C750	—	300	F,G,J,K,M													
82	CY06C820	—	TY06C820	—	300	F,G,J,K,M													

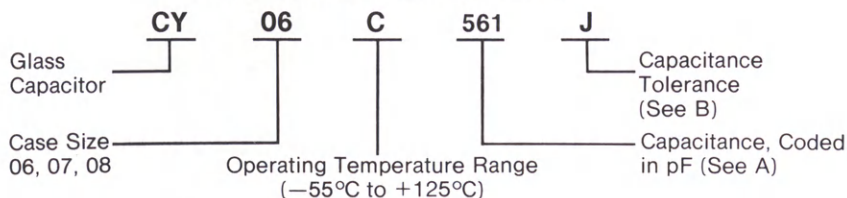
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### PART MARKING



CGW — Corning Glass Works  
CY — Glass Capacitor  
06 — Case Size  
C — Operating Temperature Range  
101 — Capacitance, Coded in pF  
J — Tolerance

## PART NUMBER EXPLANATION



A. Capacitance Code is expressed in picofarads (pF). The first two digits represent significant figures and the third digit specifies the number of zeros to follow; i.e. 561 indicates 560 pF. For values below 10 pF, R = decimal point; i.e. 1R5 indicates 1.5 pF.

B. Tolerance Code:

C = ±.25 pF    F = ±1%    J = ± 5%  
D = ±.50 pF    G = ±2%    K = ±10%  
                       M = ±20%



# Glass Capacitors



## CYFR 10, 15, 20, 30 (HIGH RELIABILITY)

### APPLICATIONS

CORNING® style CYFR high reliability glass capacitors have failure rates among the lowest available. Outstanding stability, reliability and electrical performance are provided by the fused monolithic construction, which is virtually immune to environmental stresses. These capacitors meet or exceed all requirements of Corning specifications J-950 and J-951, which combine the most exacting features of many specifications and substantially exceed most.

### PERFORMANCE CHARACTERISTICS

**Tolerance** — Available tolerances for each value of capacitance are shown in the Ordering Information table. For codes, refer to the Part Numbers paragraph.

**Temperature Coefficient** —  $+140 \pm 25$  ppm/°C at 100 kHz. TC will track and retrace to within  $\pm 5$  ppm. Capacitance drift is less than 0.1% or 0.1 pf, whichever is greater.

**Voltage Coefficient** — Zero.

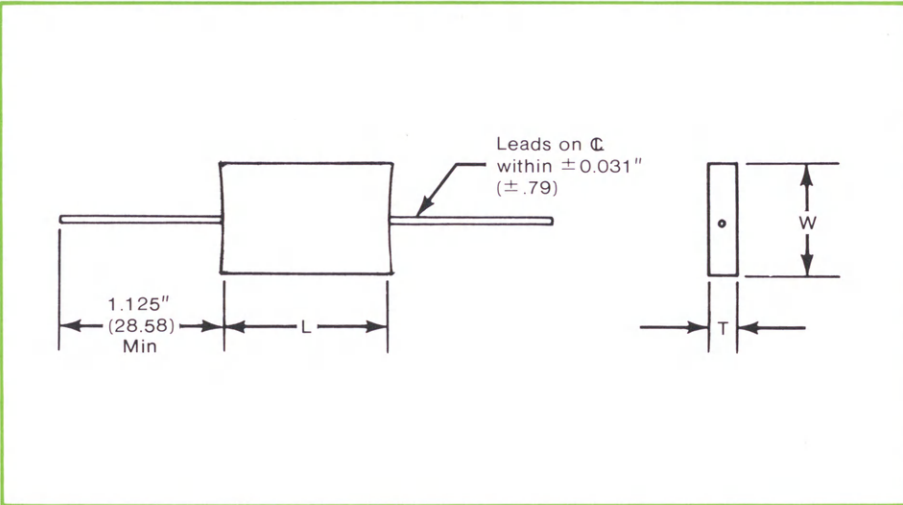
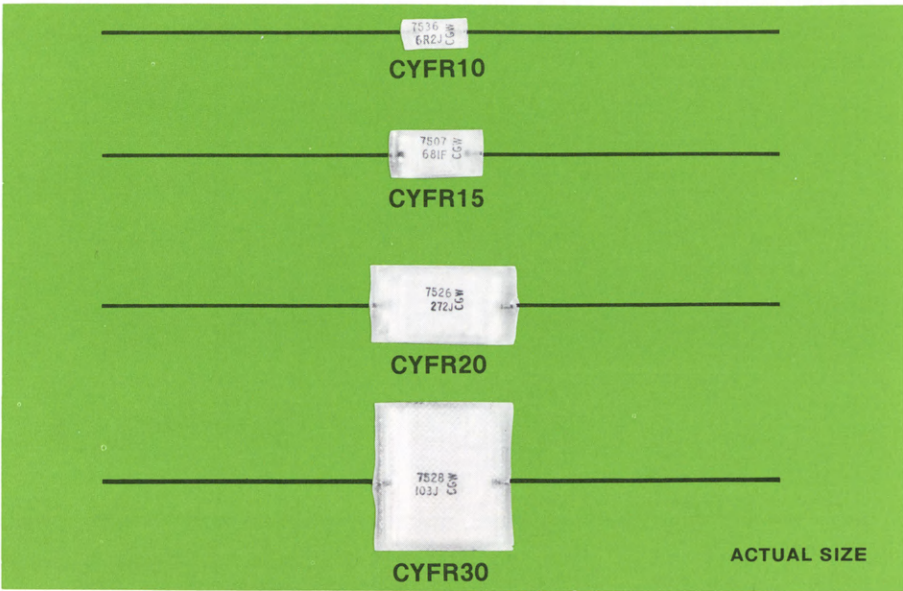
**Losses** — Extremely low, and remain relatively low at elevated temperatures and high frequencies. Dissipation factor is less than 0.001 at 1 kHz and 25°C.

**Life** — After 2,000 hours at 125°C with 150% of rated voltage applied, capacitance change is less than 0.5% or 0.5 pf, dissipation factor is less than 0.0015, and insulation resistance is greater than 500,000 megohms.

**Insulation Resistance** — Greater than 500,000 megohms at 25°C; greater than 10,000 megohms at 125°C.

**Voltage/Temperature Ratings** — Voltage ratings are shown in the ordering information table. The operating temperature range is  $-55^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$  with no derating required.

**Moisture Resistance** — Meets or exceeds all requirements of J-951 and MIL-STD-202, Method 106 for 50 cycles.



Dimensions — Inches (Millimeters)				Lead Dia + .004 (+0.1) — .001 (—0.03)	Weight (Grams)
Style	L Min - Max	W Min - Max	T Min - Max		
CYFR10	.2969 — .3906 (7.54 — 9.93)	.1406 — .2031 (3.58 — 5.16)	.0469 — .1093 (1.19 — 2.77)	.020 24 AWG (.51)	.25 — .50
CYFR15	.4219 — .5156 (10.72 — 13.11)	.2344 — .2968 (5.94 — 7.54)	.0625 — .1562 (1.60 — 3.96)	.020 24 AWG (.51)	.75 — 1.25
CYFR20	.6719 — .7968 (17.07 — 20.24)	.3750 — .4687 (9.52 — 11.91)	.0938 — .1875 (2.39 — 4.78)	.025 22 AWG (.63)	2.50 — 4.00
CYFR30	.7032 — .8281 (17.86 — 21.03)	.6719 — .8281 (17.07 — 21.03)	.0938 — .1875 (2.39 — 4.78)	.025 22 AWG (.63)	5.00 — 7.00

**Note:** Leads are solderable and weldable Dumet.



PART NUMBERS AND ORDERING INFORMATION

Capacitance Value (pF)	Corning Part Number	DC Working Voltage	Tolerances Available	Capacitance Value (pF)	Corning Part Number	DC Working Voltage	Tolerances Available
STANDARD VALUES CYFR10				STANDARD VALUES CYFR15, con't.			
0.5	CYFR10 .5OR5 **	500	C	240	CYFR15 .241 **	500	F,G,J
1.0	CYFR10 .010	500	C	270	CYFR15 .271	500	F,G,J
1.5	CYFR10 .1R5	500	C	300	CYFR15 .301	500	F,G,J
2.2	CYFR10 .2R2	500	C,D	330	CYFR15 .331	500	F,G,J
2.7	CYFR10 .2R7	500	C	360	CYFR15 .361	500	F,G,J
3.0	CYFR10 .030	500	C,D	390	CYFR15 .391	500	F,G,J
3.3	CYFR10 .3R3	500	C	430	CYFR15 .431	500	F,G,J
3.6	CYFR10 .3R6	500	C,D	470	CYFR15 .471	500	F,G,J
3.9	CYFR10 .3R9	500	C	510	CYFR15 .511	500	F,G,J
4.3	CYFR10 .4R3	500	C,D	560	CYFR15 .561	300	F,G,J
4.7	CYFR10 .4R7	500	C	620	CYFR15 .621	300	F,G,J
5.1	CYFR10 .5R1	500	C	680	CYFR15 .681	300	F,G,J
5.6	CYFR10 .5R6	500	C	750	CYFR15 .751	300	F,G,J
6.2	CYFR10 .6R2	500	C,J	820	CYFR15 .821	300	F,G,J
6.8	CYFR10 .6R8	500	C,J	910	CYFR15 .911	300	F,G,J
7.5	CYFR10 .7R5	500	C,J	1000	CYFR15 .102	300	F,G,J
8.2	CYFR10 .8R2	500	C,J	1100	CYFR15 .112	300	F,G,J
9.1	CYFR10 .9R1	500	C,J	1200	CYFR15 .122	300	F,G,J
10	CYFR10 .100	500	C,J	STANDARD VALUES CYFR20			
11	CYFR10 .110	500	C,J	560	CYFR20 .561 **	500	F,G,J
12	CYFR10 .120	500	C,J	620	CYFR20 .621	500	F,G,J
13	CYFR10 .130	500	G,J	680	CYFR20 .681	500	F,G,J
15	CYFR10 .150	500	G,J	750	CYFR20 .751	500	F,G,J
16	CYFR10 .160	500	G,J	820	CYFR20 .821	500	F,G,J
18	CYFR10 .180	500	G,J	910	CYFR20 .911	500	F,G,J
20	CYFR10 .200	500	G,J	1000	CYFR20 .102	500	F,G,J
22	CYFR10 .220	500	G,J	1100	CYFR20 .112	500	F,G,J
24	CYFR10 .240	500	G,J	1200	CYFR20 .122	500	F,G,J
27	CYFR10 .270	500	F,G,J	1300	CYFR20 .132	500	F,G,J
30	CYFR10 .300	500	F,G,J	1500	CYFR20 .152	500	F,G,J
33	CYFR10 .330	500	F,G,J	1600	CYFR20 .162	500	F,G,J
36	CYFR10 .360	500	F,G,J	1800	CYFR20 .182	500	F,G,J
39	CYFR10 .390	500	F,G,J	2000	CYFR20 .202	500	F,G,J
43	CYFR10 .430	500	F,G,J	2200	CYFR20 .222	500	F,G,J
47	CYFR10 .470	500	F,G,J	2400	CYFR20 .242	500	F,G,J
51	CYFR10 .510	500	F,G,J	2700	CYFR20 .272	500	F,G,J
56	CYFR10 .560	500	F,G,J	3000	CYFR20 .302	500	F,G,J
62	CYFR10 .620	500	F,G,J	3300	CYFR20 .332	500	F,G,J
68	CYFR10 .680	500	F,G,J	3600	CYFR20 .362	300	F,G,J
75	CYFR10 .750	500	F,G,J	3900	CYFR20 .392	300	F,G,J
82	CYFR10 .820	500	F,G,J	4300	CYFR20 .432	300	F,G,J
91	CYFR10 .910	500	F,G,J	4700	CYFR20 .472	300	F,G,J
100	CYFR10 .101	500	F,G,J	5100	CYFR20 .512	300	F,G,J
110	CYFR10 .111	500	F,G,J	STANDARD VALUES CYFR30			
120	CYFR10 .121	500	F,G,J	3600	CYFR30 .362 **	500	F,G,J
130	CYFR10 .131	500	F,G,J	3900	CYFR30 .392	500	F,G,J
150	CYFR10 .151	500	F,G,J	4300	CYFR30 .432	500	F,G,J
160	CYFR10 .161	300	F,G,J	4700	CYFR30 .472	500	F,G,J
180	CYFR10 .181	300	F,G,J	5100	CYFR30 .512	500	F,G,J
200	CYFR10 .201	300	F,G,J	5600	CYFR30 .562	500	F,G,J
220	CYFR10 .221	300	F,G,J	6200	CYFR30 .622	500	F,G,J
240	CYFR10 .241	300	F,G,J	6800	CYFR30 .682	300	F,G,J
STANDARD VALUES CYFR15				7500	CYFR30 .752	300	F,G,J
160	CYFR15 .161 **	500	F,G,J	8200	CYFR30 .822	300	F,G,J
180	CYFR15 .181	500	F,G,J	9100	CYFR30 .912	300	F,G,J
200	CYFR15 .201	500	F,G,J	10000	CYFR30 .103	300	F,G,J
220	CYFR15 .221	500	F,G,J				

\*Add S or G for lead finish

\*\*Add letter for tolerance code

CERAMIC/GLASS-K™ CAPACITORS

SOLID TANTALUM CAPACITORS

METAL FILM RESISTORS

PACKAGING

PART MARKING

PART NUMBER EXPLANATION

7744  
101J  
CGW

77 — Year  
44 — Lot Code  
101 — Capacitance, Coded in pF  
J — Tolerance  
CGW — Corning Glass Works

CYFR10G101JA

High Reliability Glass Capacitor  
Case Size 10, 15, 20, 30  
Lead Finish  
S = Solder Coated Dumet  
G = Gold Plated Dumet (50 μinch minimum)

A

Test Level  
A = J-950 Specification  
No designator = J-951 Specification  
Capacitance Tolerance (See B)  
Capacitance, Coded in pF (See A)

A. Capacitance Code is expressed in picofarads (pF). The first two digits represent significant figures and the third digit specifies the number of zeros to follow; i.e. 561 indicates 560 pF. For fractional values below 10pF, R = decimal point; i.e. 1R5 indicates 1.5 pF.

B. Tolerance Code:  
C = ± .25 pF  
D = ± .50 pF  
F = ± 1%  
G = ± 2%  
J = ± 5%



M23269/01, 02, 03, 04, 10 (QPL TO MIL-C-23269)  
CYR10, 15, 20, 30, 51, 52, 53 (ESTABLISHED RELIABILITY)  
FAILURE RATE LEVELS L, M, AND S

These precision glass-dielectric capacitors are QPL to Established Reliability specification MIL-C-23269. Fused monolithic construction provides excellent electrical performance, environmental immunity, stability and retraceability. These capacitors are available in both axial and radial configurations.

**Temperature Coefficient** — +140 ± 25 ppm/°C from -55°C to +125°C. TC of all units will track and retrace to within ± 5 ppm.

**Life** — At rated conditions (100% rated voltage, 125°C), capacitance change is less than:

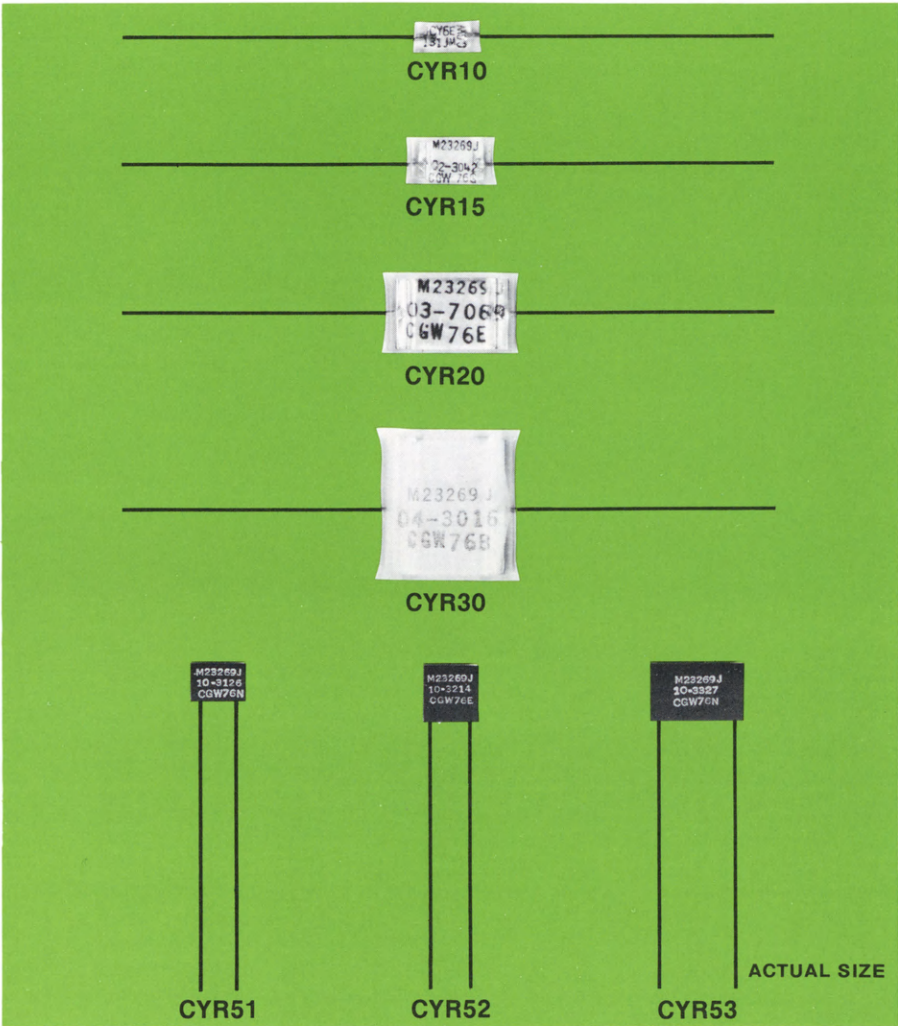
- ± 0.5% after 2,000 hours
- ± 2.0% after 30,000 hours

At accelerated conditions (150% rated voltage, 125°C), capacitance change is less than:

- ± 0.5% after 2,000 hours
- ± 2.0% after 6,000 hours

**Insulation Resistance** — A minimum of 100,000 megohms at 25°C and 10,000 megohms at 125°C.

**Voltage/Temperature Ratings** — Voltage ratings are shown in the part number tables. The operating temperature range is -55°C to +125°C.



Dimensions — Inches (Millimeters)

Case Size	L	W	T	Lead Dia. +.004 (+0.1) -.001 (-0.03)
CYR10	.344 ± .047 (8.74 ± 1.19)	.172 ± .031 (4.37 ± .79)	.078 ± .031 (1.98 ± .79)	.020 (.51)
CYR15	.469 ± .047 (11.91 ± 1.19)	.266 ± .031 (6.76 ± .79)	.109 ± .047 (2.77 ± 1.19)	.020 (.51)
CYR20	.734 ± .062 (18.64 ± 1.57)	.422 ± .047 (10.72 ± 1.19)	.141 ± .047 (3.58 ± 1.19)	.025 (.63)
CYR30	.766 ± .062 (19.46 ± 1.57)	.750 ± .078 (19.05 ± 1.98)	.141 ± .047 (3.58 ± 1.19)	.025 (.63)

NOTE: All leads are solder coated, copper-clad nickel-iron.

Dimensions — Inches (Millimeters)

Case Size	L ±.005 (±.13)	W ±.010 (±.25)	T ±.005 (±.13)	Lead Dia. ±.002 (±.051)	S ±.020 (±.51)
CYR51	.300 (7.62)	.200 (5.08)	.115 (2.92)	.020 (.51)	.200 (5.08)
CYR52	.300 (7.62)	.300 (7.62)	.115 (2.92)	.020 (.51)	.200 (5.08)
CYR53	.500 (12.70)	.300 (7.62)	.115 (2.92)	.020 (.51)	.400 (10.16)

NOTE: All leads are copper-clad nickel-iron, in accordance with MIL-STD-1276 TYPE D.



# PART NUMBERS AND ORDERING INFORMATION (AXIAL LEAD)

Value (pF)	Part Number* Capacitance Tolerance	Value (pF)	Part Number* Capacitance Tolerance	Value (pF)	Part Number* Capacitance Tolerance
<b>STYLE CYR10 M23269/01-</b>		<b>STYLE CYR10 M23269/01- (cont'd.)</b>		<b>STYLE CYR20 M23269/03-</b>	
500 Volts	±.25pF ±.5pF ±5%	500 Volts	±1% ±2% ±5%	500 Volts	±1% ±2% ±5%
.5	*.001 — —	68	*.079 *.080 *.081	560	*.001 *.002 *.003
1.0	—.002 — —	75	—.082 —.083 —.084	620	—.004 —.005 —.006
1.5	—.003 — —	82	—.085 —.086 —.087	680	—.007 —.008 —.009
2.2	—.004 *.005 — —	91	—.088 —.089 —.090	750	—.010 —.011 —.012
2.7	—.006 — —	100	—.091 —.092 —.093	820	—.013 —.014 —.015
3.0	—.007 —.008 — —	110	—.094 —.095 —.096	910	—.016 —.017 —.018
3.3	—.009 — —	120	—.097 —.098 —.099	1000	—.019 —.020 —.021
3.6	—.010 —.011 — —	130	—.100 —.101 —.102	1100	—.022 —.023 —.024
3.9	—.012 — —	150	—.103 —.104 —.105	1200	—.025 —.026 —.027
4.3	—.013 —.014 — —	160	—.106 —.107 —.108	1300	—.028 —.029 —.030
4.7	—.015 — —	180	—.109 —.110 —.111	1500	—.031 —.032 —.033
5.1	—.016 — —	200	—.112 —.113 —.114	1600	—.034 —.035 —.036
5.6	—.017 — — *.018	300 Volts		1800	—.037 —.038 —.039
6.2	—.019 — — *.020	220	—.115 —.116 —.117	2000	—.040 —.041 —.042
6.8	—.021 — — *.022	240	—.118 —.119 —.120	2200	—.043 —.044 —.045
7.5	—.023 — — *.024	270	—.121 —.122 —.123	2400	—.046 —.047 —.048
8.2	—.025 — — *.026	300	—.124 —.125 —.126	2700	—.049 —.050 —.051
9.1	—.027 — — *.028			3000	—.052 —.053 —.054
10	—.029 — — *.030			3300	—.055 —.056 —.057
11	—.031 — — *.032			300 Volts	
12	—.033 — — *.034			3600	—.058 —.059 —.060
	±1% ±2% ±5%			3900	—.061 —.062 —.063
13	— — *.035 *.036	220	*.001 *.002 *.003	4300	—.064 —.065 —.066
15	— — *.037 *.038	240	—.004 —.005 —.006	4700	—.067 —.068 —.069
16	— — *.039 *.040	270	—.007 —.008 —.009	5100	—.070 —.071 —.072
18	— — *.041 *.042	300	—.010 —.011 —.012		
20	— — *.043 *.044	330	—.013 —.014 —.015	<b>STYLE CYR30 M23269/04-</b>	
22	— — *.045 *.046	360	—.016 —.017 —.018	500 Volts	±1% ±2% ±5%
24	— — *.047 *.048	390	—.019 —.020 —.021	3600	*.001 *.002 *.003
27	*.049 —.050 —.051	430	—.022 —.023 —.024	3900	—.004 —.005 —.006
30	—.052 —.053 —.054	470	—.025 —.026 —.027	4300	—.007 —.008 —.009
33	—.055 —.056 —.057	510	—.028 —.029 —.030	4700	—.010 —.011 —.012
36	—.058 —.059 —.060	300 Volts		5100	—.013 —.014 —.015
39	—.061 —.062 —.063	560	—.031 —.032 —.033	5600	—.016 —.017 —.018
43	—.064 —.065 —.066	620	—.034 —.035 —.036	6200	—.019 —.020 —.021
47	—.067 —.068 —.069	680	—.037 —.038 —.039	300 Volts	
51	—.070 —.071 —.072	750	—.040 —.041 —.042	6800	—.022 —.023 —.024
56	—.073 —.074 —.075	820	—.043 —.044 —.045	7500	—.025 —.026 —.027
62	—.076 —.077 —.078	910	—.046 —.047 —.048	8200	—.028 —.029 —.030
		1000	—.049 —.050 —.051	9100	—.031 —.032 —.033
		1100	—.052 —.053 —.054	10000	—.034 —.035 —.036
		1200	—.055 —.056 —.057		

CERAMIC/GLASS-K™  
CAPACITORS

SOLID TANTALUM  
CAPACITORS

# PART NUMBERS AND ORDERING INFORMATION (RADIAL LEAD)

Value (pF)	Part Number* Capacitance Tolerance	Value (pF)	Part Number* Capacitance Tolerance	Value (pF)	Part Number* Capacitance Tolerance
<b>STYLE CYR51 M23269/10-</b>		<b>STYLE CYR51 M23269/10-</b>		<b>STYLE CYR51 M23269/10- (cont'd.)</b>	
300 Volts	±.25pF ±2% ±5%	300 Volts	±1% ±2% ±5%	300 Volts	±1% ±2% ±5%
1	*.001 — —	27	*.052 *.053 *.054	300	*.127 *.128 *.129
1.5	—.002 — —	30	—.055 —.056 —.057	330	—.130 —.131 —.132
2.2	—.003 — —	33	—.058 —.059 —.060	360	—.133 —.134 —.135
2.7	—.004 — —	36	—.061 —.062 —.063	390	—.136 —.137 —.138
3.0	—.005 — —	39	—.064 —.065 —.066	430	—.139 —.140 —.141
3.3	—.006 — —	43	—.067 —.068 —.069	470	—.142 —.143 —.144
3.6	—.007 — —	47	—.070 —.071 —.072	510	—.145 —.146 —.147
3.9	—.008 — —	51	—.073 —.074 —.075	560	—.148 —.149 —.150
4.3	—.009 — —	56	—.076 —.077 —.078		
4.7	—.010 — —	62	—.079 —.080 —.081	<b>STYLE CYR52 M23269/10-</b>	
5.1	—.011 — — *.012	68	—.082 —.083 —.084	300 Volts	±1% ±2% ±5%
5.6	—.013 — — *.014	75	—.085 —.086 —.087	620	*.201 *.202 *.203
6.2	—.015 — — *.016	82	—.088 —.089 —.090	680	—.204 —.205 —.206
6.8	—.017 — — *.018	91	—.091 —.092 —.093	750	—.207 —.208 —.209
7.5	—.019 — — *.020	100	—.094 —.095 —.096	820	—.210 —.211 —.212
8.2	—.021 — — *.022	110	—.097 —.098 —.099	910	—.213 —.214 —.215
9.1	—.023 — — *.024	120	—.100 —.101 —.102	1000	—.216 —.217 —.218
10	—.025 — — *.026	130	—.103 —.104 —.105		
11	—.027 — — *.028	150	—.106 —.107 —.108	<b>STYLE CYR53 M23269/10-</b>	
12	—.029 — — *.030	160	—.109 —.110 —.111	300 Volts	±1% ±2% ±5%
13	—.031 —.032 —.033	180	—.112 —.113 —.114	1100	*.301 *.302 *.303
15	—.034 —.035 —.036	200	—.115 —.116 —.117	1200	—.304 —.305 —.306
16	—.037 —.038 —.039	220	—.118 —.119 —.120	1300	—.307 —.308 —.309
18	—.040 —.041 —.042	240	—.121 —.122 —.123	1500	—.310 —.311 —.312
20	—.043 —.044 —.045	270	—.124 —.125 —.126	1600	—.313 —.314 —.315
22	—.046 —.047 —.048			1800	—.316 —.317 —.318
24	—.049 —.050 —.051			2000	—.319 —.320 —.321
				2200	—.322 —.323 —.324
				2400	—.325 —.326 —.327

METAL FILM  
RESISTORS

PACKAGING

## Examples:

M23269/01-3007 M23269/10-2053  
CYR10 3pF ±.25pF CYR51 27pF ±2%  
M Failure Rate L Failure Rate

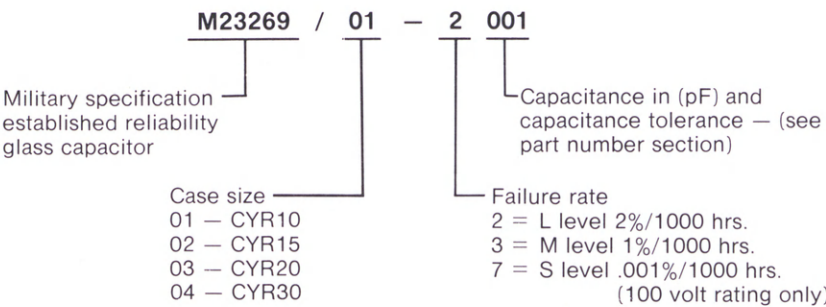
## Failure Rate (90% Confidence)

2 — L 2%/1000 Hours  
3 — M 1%/1000 Hours  
7 — S .001%/1000 Hours

NOTE: Available only in CYR10-30 styles with 100 wvdc rating.



PART NUMBER EXPLANATION FOR CYR10-30



PART MARKING—CYR10



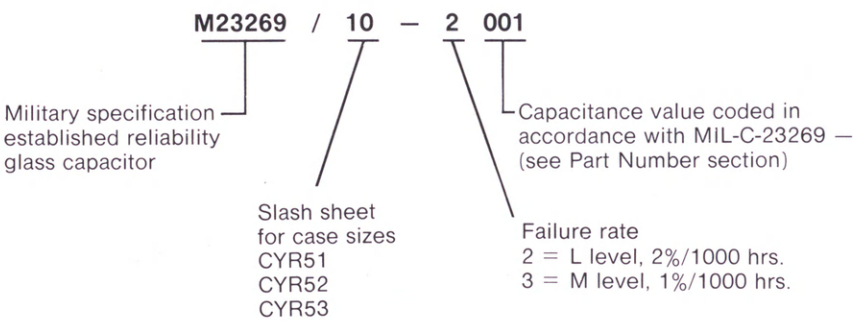
J—Jan Trademark OR5—Capacitance code—  
C—Capacitor OR5 = 0.5pF  
Y—Glass Dielectric J—Capacitance tolerance—  
7—Last digit of year J = ±5%  
A—4 week lot code M—Failure level

PART MARKING—CYR15-30

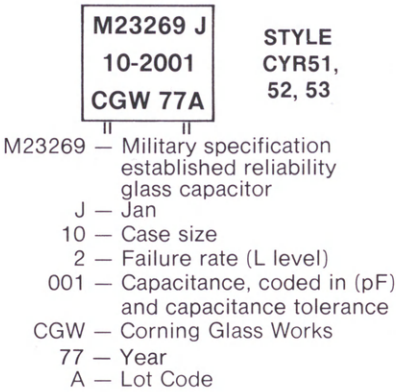


M23269—Military specification established reliability glass capacitor  
J—Jan trademark  
02—Case size (CYR15)  
2—Failure rate (L level)  
126—Dash Number—(capacitance in pF and capacitance tolerance)  
CGW—Corning Glass Works  
77—Year  
A—Lot Code

PART NUMBER EXPLANATION FOR CYR51-53



PART MARKING



Cross-Reference Information

MIL-C-23269	MIL-C-11272
Style	Style
CYR10	CY10
CYR15	CY15
CYR20	CY20
CYR30	CY30
CYR51	CY06
CYR52	CY07
CYR53	CY08



## CERAMIC/GLASS-K™ CAPACITORS

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## For the following:

- Placement of orders
- Price quotations
- Delivery
- Specifications or drawing reviews
- Samples
- Location of a franchised distributor

**Contact:****Customer Service**

Corning Glass Works  
3900 Electronics Drive  
Raleigh, NC 27604  
(919) 876-1100  
TLX — 579411  
TWX — 510-928-1840

- Technical information  
Product capabilities  
Applications assistance

**Customer Engineering**

Corning Glass Works  
3900 Electronics Drive  
Raleigh, NC 27604  
(919) 876-1100  
TLX — 579411  
TWX — 510-928-1840



# Introduction to Ceramic/GLASS-K™ Capacitors

CORNING

Corning Glass Works has been producing high quality ceramic capacitors for over ten years. Our molded military styles are qualified to MIL-C-11015 and MIL-C-30914. Corning pioneered and introduced in 1972 SPINSEAL™ axial ceramic capacitors coated with epoxy for commercial applications.

Concentrated effort on the development and manufacture of axial ceramic capacitors has resulted in our high quality image, high volume capacity, and technological leadership. Corning's emphasis on the axial configuration results from the growing need for automatic handling of electronic components. Corning's axial leaded capacitors are available lead taped and reeled. They're ideally suited for the automatic handling operations of cut and bend, insertion, and sequencing.

## HIGHEST QUALITY CONSTRUCTION

### Chip

The chip is the monolithic ceramic capacitor element. It is the major source of all electrical characteristics of the finished capacitor.

Quality cannot be added to the finished chip. The chip must have the quality built in from the beginning. Corning carefully stacks alternate layers of precisely controlled dielec-

tric and proprietary electrode materials to form the chip. The chip is then fused into a solid monolithic configuration assuring reliability and volumetric efficiency. The final stage of chip manufacture is the application of a silver end termination which is fired on to assure permanent electrode contact.

### Lead Attach

A unique, tightly controlled, highly automated lead attach process results in a reliable bonding of the leads to the capacitor chip. The ability of the axial ceramic capacitor to withstand the rigors of automatic insertion and to maintain a dependable electrical contact over the life of the circuit depends upon a sound lead attach.

### Coating

The products qualified to MIL-C-11015 and MIL-C-39014 are encapsulated by a transfer molding process which ensures compliance to both the maximum and minimum dimensions specified.

SPINSEAL commercial axial ceramic capacitors are coated by a high volume, automated process which ensures a uniform conformal coating. The conformally coated ceramic capacitors essentially meet the maximum dimensions specified for the molded product.

Regardless of the coating specified, molded or conformal, the performance of the product is assured by the environmental protection barrier offered by the two coating methods.

### Dielectrics

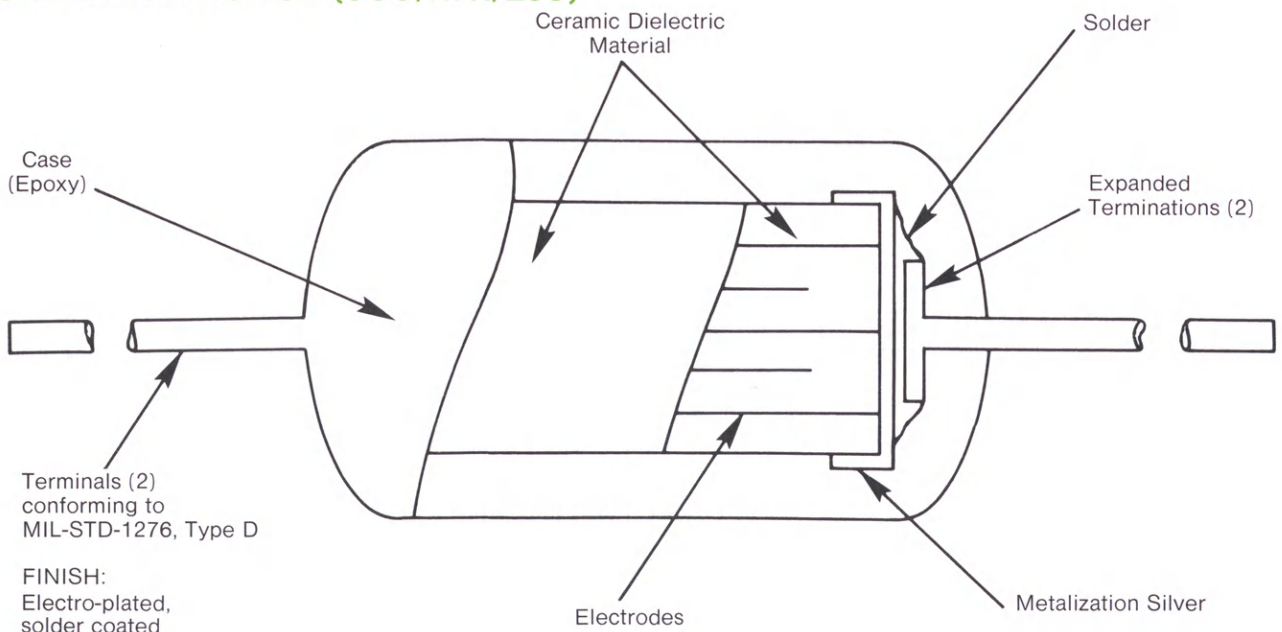
The military qualified products are supplied with the BX and BR temperature characteristics specified by MIL-C-11015 and MIL-C-39014.

The commercial products are available in one of three different dielectrics, depending on the performance desired:

- COG dielectric offers the ultra-stable performance of  $0 \pm 30$ PPM temperature characteristics.
- X7R dielectric offers the stable performance of  $\pm 15\%$  temperature characteristic.
- Z5U dielectric offers the general purpose  $+22\% -56\%$  temperature characteristic.

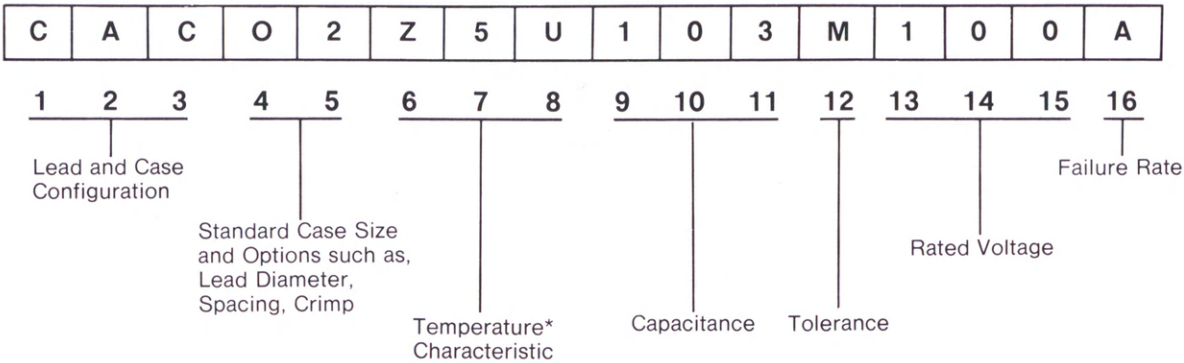
GLASS-K™ glass-ceramic capacitors are made from a proprietary material especially formulated to give a high dielectric constant with the inherent stability of glass. Corning's leadership in glass technology assures performance and reliability of this product line which is also qualified to MIL-C-39014.

## CAC STYLE CAPACITOR (COG/X7R/Z5U)



INDUSTRIAL CERAMIC CAPACITOR PART NUMBERING SYSTEM

All *industrial ceramic* capacitor numbers will consist of a 16-character code. The significance of the individual characters in the code is shown in the Character Key. (Does not apply to GLASS-K products.)



CHARACTER KEY – (Based on standard EIA part numbering system)

1. Always "C" (for Corning Ceramic Capacitor)

2. Lead Configuration  
"A" – Axial  
"R" – Radial  
"C" – Chip

3. Case Configuration  
"C" – Conformal Coat  
"U" – Uncased (un-insulated)

4 & 5. Standard leads and spacing indicated by character 4 = "0". Other digits would indicate listed options such as lead size, spacing, crimp. Character 5 indicates the case size.
6. Low Temperature Limit, °C  
Symbol      Low Temp. Limit, °C  
Z              +10  
Y              -30  
X              -55

7. High Temperature Limit, °C  
Symbol      High Temp. Limit, °C  
2              +45  
4              +65  
5              +85  
6              +105  
7              +125

8.      Symbol      % TC      Symbol      % TC  
A           ±1.0      P           ±10.0  
B           ±1.5      R           ±15.0  
C           ±2.2      S           ±22.0  
D           ±3.3      T           +22, -33  
E           ±4.7      U           +22, -56  
F           ±7.5      V           +22, -82

9. 10 & 11. Capacitance in Picofarads.  
9 = 1st significant figure. 10 = 2nd significant figure.  
11 = Multiplier (number of zeros).
12. Tolerance Designator  
C = ±.25 pF  
D = ±.5 pF  
F = ±1%  
G = ±2%  
J = ±5%  
K = ±10%  
M = ±20%  
Z = +80, -20%

13, 14 & 15. Voltage Rating – Vdc  
100 = 100 Vdc  
050 = 50 Vdc

16. Failure Rate  
A = Not Applicable  
L = 2% per 1,000 hours  
M = 1% per 1,000 hours  
P = 0.1% per 1,000 hours  
R = .01% per 1,000 hours  
S = .001% per 1,000 hours
- \*Notes 6, 7, 8 above apply to X7R & Z5U. COG is 0±30PPM/°C.



CAC02, 03, 04, 05  
SPINSEAL™ Z5U CAPACITORS

These conformally coated axial lead-  
ed ceramic capacitors are designed  
for high volume commercial and in-  
dustrial applications which specify  
general purpose T.C. performance.  
Applications include bypass, blocking  
/coupling, filtering and transient sup-  
pression. High speed encapsulation  
technology enables us to manufac-  
ture axial ceramic capacitors in high  
volume while closely controlling uni-  
formity and performance. Spinseal  
capacitors are especially suited for  
automatic insertion.

Molded and military qualified styles  
are available upon request.

PERFORMANCE  
CHARACTERISTICS:

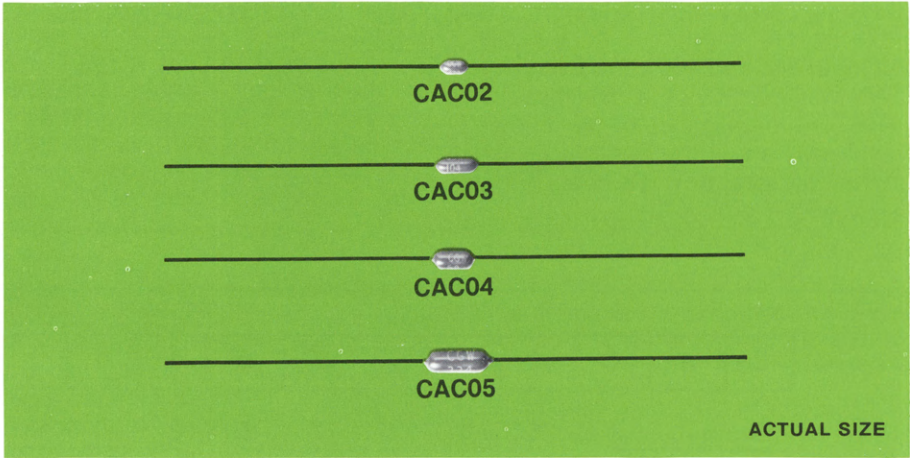
**Capacitance Tolerance:**  
M = ±20%  
Z = +80, -20%

**Temperature Characteristic:**  
**Z5U** (general purpose) +22%, -56%  
from +10°C to +85°C.

**Dissipation Factor:**  
3.0% Maximum at 1KHz

**Insulation Resistance:**  
10,000 megohms or 100 megohm-  
microfarads, whichever is less.

**Dielectric Strength:**  
2.5 times rated voltage for 1 to 5  
seconds.



QUALITY ASSURANCE  
REQUIREMENTS:

Our Spinseal miniature monolithic  
capacitors are tested in accordance  
with EIA RS — 198. Each lot is in-  
spected for:

- Capacitance
- Dissipation Factor
- Insulation Resistance
- Dielectric Strength
- Visual Examination

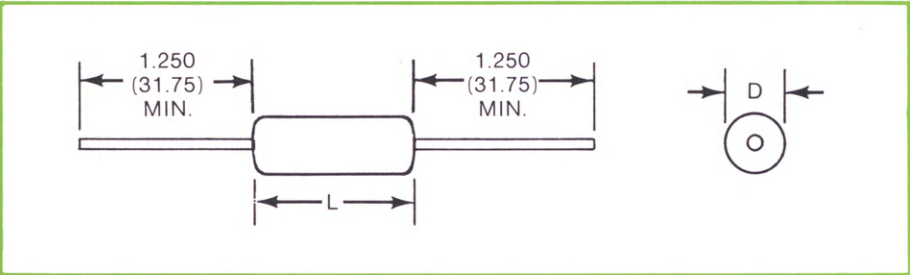


TABLE OF DIMENSIONS AND CAPACITANCE RANGE

Case Size	Dimensions — Inches (Millimeters)		Lead Dia. ±.002 (.05)	Voltage Rating	Z5U Capacitance Range
	L MAX	D MAX			
CAC02	.170 (4.32)	.100 (2.54)	.020 (.51)	100 50	.001 μF to .022 μF .022 μF to .047 μF
CAC03	.260 (6.60)	.100 (2.54)	.020 (.51)	100 50	.022 μF to .056 μF .056 μF to .12 μF
CAC04	.270 (6.86)	.150 (3.81)	.020 (.51)	100 50	.068 μF to .12 μF .10 μF to .27 μF
CAC05	.400 (10.16)	.150 (3.81)	.025 (.64)	100 50	.10 μF to .27 μF .27 μF to .47 μF

## PART NUMBERS AND ORDERING INFORMATION

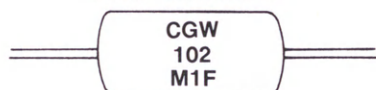
CAC02 PART NUMBERS		CAC02 PART NUMBERS (cont'd.)		CAC03 PART NUMBERS (cont'd.)		CAC04 PART NUMBERS (cont'd.)	
CAP.	100 VOLT	CAP.	100 VOLT	CAP.	50 VOLT	CAP.	50 VOLT
1000pF	CAC02Z5U102 * 100A	.018μF	CAC02Z5U183 — 100A	.068μF	CAC03Z5U683 — 050A	.22μF	CAC04Z5U224 * 050A
1200pF	CAC02Z5U122 — 100A	.022μF	CAC02Z5U223 — 100A	.082μF	CAC03Z5U823 — 050A	.27μF	CAC04Z5U274 — 050A
1500pF	CAC02Z5U152 — 100A	CAP. 50 VOLT		.10μF	CAC03Z5U104 — 050A	CAC05 PART NUMBERS	
1800pF	CAC02Z5U182 — 100A	.027μF	CAC02Z5U273 * 050A	.12μF	CAC03Z5U124 — 050A		
2200pF	CAC02Z5U222 — 100A	.033μF	CAC02Z5U333 — 050A	CAC04 PART NUMBERS		CAP. 100 VOLT	
2700pF	CAC02Z5U272 — 100A	.039μF	CAC02Z5U393 — 050A			.15μF CAC05Z5U154 * 100A	
3300pF	CAC02Z5U332 — 100A	.047μF	CAC02Z5U473 — 050A	CAP. 100 VOLT		.18μF CAC05Z5U184 — 100A	
3900pF	CAC02Z5U392 — 100A	CAC03 PART NUMBERS				.068μF CAC04Z5U683 * 100A	
4700pF	CAC02Z5U472 — 100A			CAP. 100 VOLT		.082μF CAC04Z5U823 — 100A	
5600pF	CAC02Z5U562 — 100A	CAP. 100 VOLT		.10μF CAC04Z5U104 — 100A		.22μF CAC05Z5U224 — 100A	
6800pF	CAC02Z5U682 — 100A			.12μF CAC04Z5U124 — 100A		.27μF CAC05Z5U274 — 100A	
8200pF	CAC02Z5U822 — 100A	.027μF	CAC03Z5U273 * 100A	CAP. 50 VOLT		CAP. 50 VOLT	
.010μF	CAC02Z5U103 — 100A	.033μF	CAC03Z5U333 — 100A			.27μF CAC05Z5U274 * 050A	
.012μF	CAC02Z5U123 — 100A	.039μF	CAC03Z5U393 — 100A	.15μF CAC04Z5U154 * 050A		.33μF CAC05Z5U334 — 050A	
.015μF	CAC02Z5U153 — 100A	.047μF	CAC03Z5U473 — 100A	.18μF CAC04Z5U184 — 050A		.39μF CAC05Z5U394 — 050A	
		.056μF	CAC03Z5U563 — 100A			.47μF CAC05Z5U474 — 050A	
						*Insert M or Z to indicate tolerance.	

SOLID TANTALUM  
CAPACITORS

METAL FILM  
RESISTORS

PACKAGING

### PART MARKING



CGW — Corning Glass Works  
 102 — Capacitance  
 M — Tolerance  
 1 — Voltage Rating Designator  
 1 = 100V, 5 = 50V  
 F — Temperature Characteristic, Z5U

### PART NUMBER EXPLANATION

C	A	C	02	Z5U	153	M	100	A
Corning Ceramic Capacitor	Axial Leads	Conformal Coating	Case Size 02, 03 04, 05	Temperature Characteristic Z5U (+22-56% from +10°C to +85°C).	Capacitance Value in pF. Two significant figures plus multiplier. 153 = .015μ	Capacitance Tolerance M = ±20% Z = +80% -20%.	Voltage Rating 050 - 50 Volt 100 - 100 Volt	Failure Rate A - not applicable



# Ceramic Capacitors

## CAC02, 03, 04, 05 SPINSEAL™ X7R CAPACITORS

These conformally coated axial leaded ceramic capacitors are designed for high volume commercial and industrial applications which require stable performance. Applications include bypass, general purpose timing, blocking/coupling, filtering and transient suppression. High speed encapsulation technology enables us to manufacture axial ceramic capacitors in high volume while closely controlling uniformity and performance. Spinseal™ capacitors are especially suited for automatic insertion.

Molded and military qualified styles are available upon request.

### PERFORMANCE CHARACTERISTICS:

**Capacitance Tolerance:**

K = ±10%  
M = ±20%

**Temperature Characteristic:**

X7R(stable) ±15% from -55°C to +125°C.

**Dissipation Factor:**

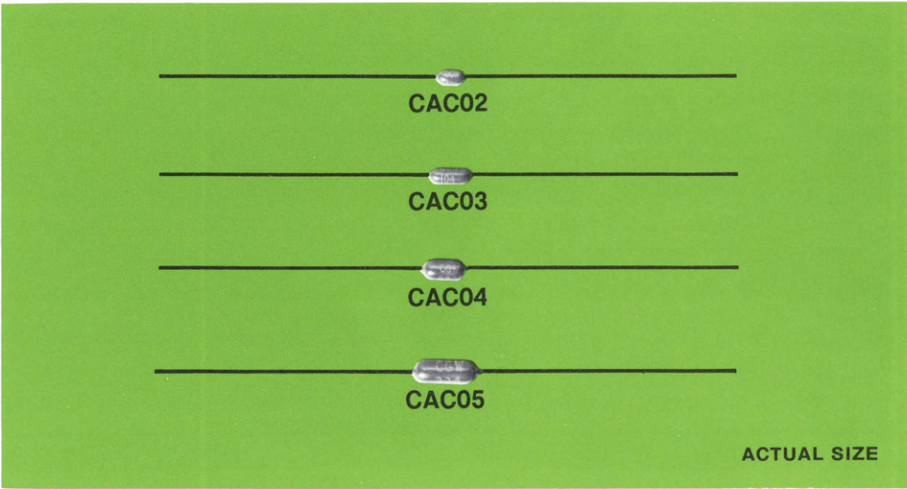
2.5% Maximum at 1 KHz

**Insulation Resistance:**

100,000 megohms or 1000 megohm-microfarads, whichever is less.

**Dielectric Strength:**

2.5 times rated voltage for 1 to 5 seconds.



### QUALITY ASSURANCE REQUIREMENTS:

Our Spinseal miniature monolithic capacitors are tested in accordance with EIA RS - 198. Each lot is inspected for:

- Capacitance
- Dissipation Factor
- Insulation Resistance
- Dielectric Strength
- Visual Examination

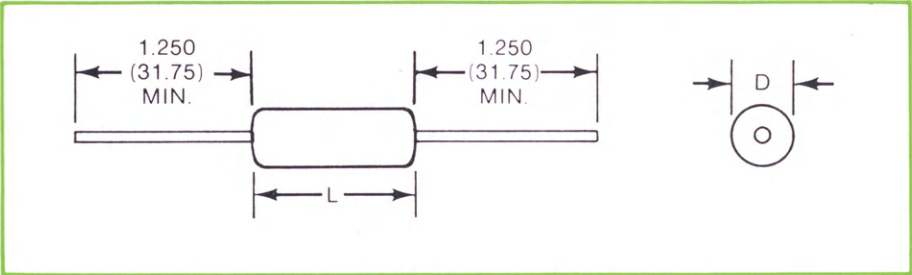


TABLE OF DIMENSIONS AND CAPACITANCE RANGE

Case Size	Dimensions — Inches (Millimeters)		Lead Dia. ±.002 (.05)	Voltage Rating	X7R Capacitance Range
	L MAX	D MAX			
CAC02	.170	.100	.020	100	10 pF to 6800 pF
	(4.32)	(2.54)	(.51)	50	5600 pF to .022 μF
CAC03	.260	.100	.020	100	5600 pF to .015 μF
	(6.60)	(2.54)	(.51)	50	.01 μF to .047 μF
CAC04	.270	.150	.020	100	.01 μF to .047 μF
	(6.86)	(3.81)	(.51)	50	.047 μF to .10 μF
CAC05	.400	.150	.025	100	.01 μF to .10 μF
	(10.16)	(3.81)	(.64)	50	.047 μF to .27 μF

PART NUMBERS AND ORDERING INFORMATION

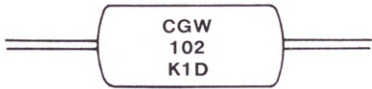
CAC02 PART NUMBERS		CAC02 PART NUMBERS (cont'd.)		CAC03 PART NUMBERS		CAC04 PART NUMBERS (cont'd.)	
CAP. 100 VOLT		CAP. 100 VOLT		CAP. 100 VOLT		CAP. 50 VOLT	
10pF	CAC02X7R100 * 100A	680pF	CAC02X7R681 — 100A	8200pF	CAC03X7R822 * 100A	.056μF	CAC04X7R563 * 050A
12pF	CAC02X7R120 — 100A	820pF	CAC02X7R821 — 100A	.010μF	CAC03X7R103 — 100A	.068μF	CAC04X7R683 — 050A
15pF	CAC02X7R150 — 100A	1000pF	CAC02X7R102 — 100A	.012μF	CAC03X7R123 — 100A	.082μF	CAC04X7R823 — 050A
18pF	CAC02X7R180 — 100A	1200pF	CAC02X7R122 — 100A	.015μF	CAC03X7R153 — 100A	.10μF	CAC04X7R104 — 050A
22pF	CAC02X7R220 — 100A	1500pF	CAC02X7R152 — 100A	CAP. 50 VOLT		CAC05 PART NUMBERS	
27pF	CAC02X7R270 — 100A	1800pF	CAC02X7R182 — 100A	.018μF	CAC03X7R183 * 050A	CAP. 100 VOLT	
33pF	CAC02X7R330 — 100A	2200pF	CAC02X7R222 — 100A	.022μF	CAC03X7R223 — 050A	.056μF	CAC05X7R563 * 100A
39pF	CAC02X7R390 — 100A	2700pF	CAC02X7R272 — 100A	.027μF	CAC03X7R273 — 050A	.068μF	CAC05X7R683 — 100A
47pF	CAC02X7R470 — 100A	3300pF	CAC02X7R332 — 100A	.033μF	CAC03X7R333 — 050A	.082μF	CAC05X7R823 — 100A
56pF	CAC02X7R560 — 100A	3900pF	CAC02X7R392 — 100A	.039μF	CAC03X7R393 — 050A	.10μF	CAC05X7R104 — 100A
68pF	CAC02X7R680 — 100A	4700pF	CAC02X7R472 — 100A	.047μF	CAC03X7R473 — 050A	CAP. 50 VOLT	
82pF	CAC02X7R820 — 100A	5600pF	CAC02X7R562 — 100A	CAC04 PART NUMBERS		.12μF	CAC05X7R124 * 050A
100pF	CAC02X7R101 — 100A	6800pF	CAC02X7R682 — 100A	CAP. 100 VOLT		.15μF	CAC05X7R154 — 050A
120pF	CAC02X7R121 — 100A	8200pF	CAC02X7R822 — 100A	.018μF	CAC04X7R183 * 100A	.18μF	CAC05X7R184 — 050A
150pF	CAC02X7R151 — 100A	.010μF	CAC02X7R103 — 050A	.022μF	CAC04X7R223 — 100A	.22μF	CAC05X7R224 — 050A
180pF	CAC02X7R181 — 100A	.012μF	CAC02X7R123 — 050A	.027μF	CAC04X7R273 — 100A	.27μF	CAC05X7R274 — 050A
220pF	CAC02X7R221 — 100A	.015μF	CAC02X7R153 — 050A	.033μF	CAC04X7R333 — 100A	*Insert M or Z to indicate tolerance.	
270pF	CAC02X7R271 — 100A	.018μF	CAC02X7R183 — 050A	.039μF	CAC04X7R393 — 100A		
330pF	CAC02X7R331 — 100A	.022μF	CAC02X7R223 — 050A	.047μF	CAC04X7R473 — 100A		
390pF	CAC02X7R391 — 100A						
470pF	CAC02X7R471 — 100A						
560pF	CAC02X7R561 — 100A						

SOLID TANTALUM CAPACITORS

METAL FILM RESISTORS

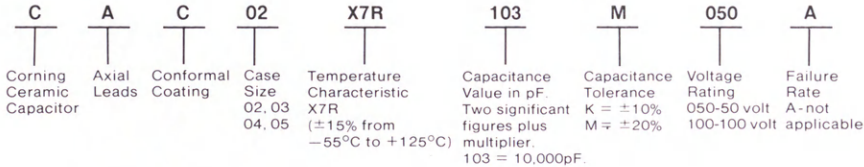
PACKAGING

PART MARKING



CGW — Corning Glass Works  
102 — Capacitance  
K — Tolerance  
1 — Voltage Rating Designator  
1 = 100V, 5 = 50V  
D — Temperature Characteristic, X7R

PART NUMBER EXPLANATION





# Ceramic Capacitors

## CAC02, 03, 04, 05 SPINSEAL™ COG CAPACITORS

These conformally coated axial lead-  
ed ceramic capacitors are designed  
for high volume commercial and in-  
dustrial applications which require  
ultra-stable performance. Applica-  
tions include precision timing, active  
and passive filtering, frequency set-  
ting, and tuning. High speed encapsu-  
lation technology enables us to manu-  
facture axial ceramic capacitors in  
high volume while closely controlling  
uniformity and performance. Spin-  
seal™ capacitors are especially suited  
for automatic insertion.  
Molded and military qualified styles  
are available upon request.

### PERFORMANCE CHARACTERISTICS:

#### Capacitance Tolerance:

- |          |             |
|----------|-------------|
| M = ±20% | G = ±2%     |
| K = ±10% | F = ±1%     |
| J = ± 5% | D = ±0.5pF  |
|          | C = ±0.25pF |

Available tolerances for each capaci-  
tance value are shown in the ordering  
information table.

#### Temperature Characteristics:

**COG** (ultra-stable).  $0 \pm 30\text{PPM}/^{\circ}\text{C}$   
from  $-55^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$ .

#### Dissipation Factor:

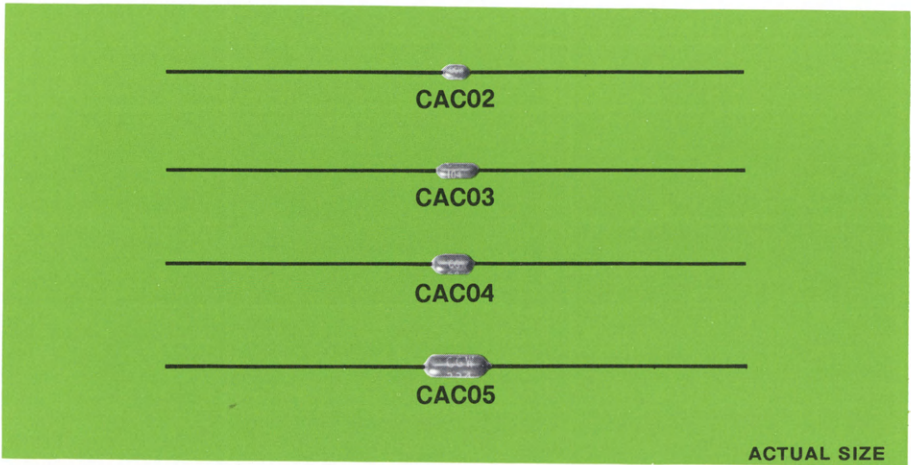
0.1% Maximum at 1 KHz

#### Insulation Resistance:

100,000 megohms

#### Dielectric Strength:

2.5 times rated voltage for 1 to 5  
seconds.



### QUALITY ASSURANCE REQUIREMENTS:

Our Spinseal miniature monolithic  
capacitors are tested in accordance  
with EIA RS — 198. Each lot is  
inspected for:

- Capacitance
- Dissipation Factor
- Insulation Resistance
- Dielectric Strength
- Visual Examination

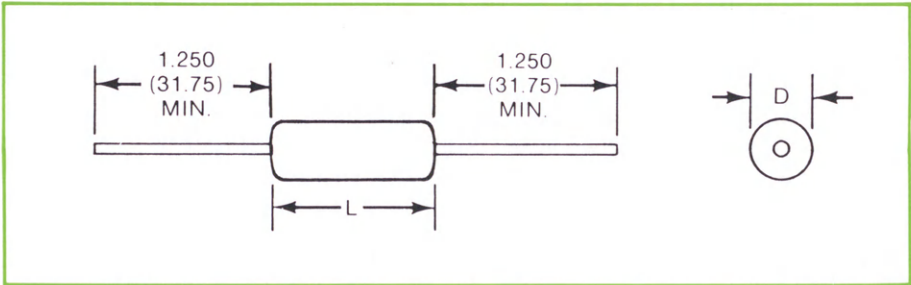


TABLE OF DIMENSIONS AND CAPACITANCE RANGE

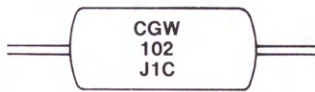
Case Size	Dimensions — Inches (Millimeters) L MAX	D MAX	Lead Dia. ±.002 (.05)	Voltage Rating	COG Capacitance Range
CAC02	.170 (4.32)	.100 (2.54)	.020 (.51)	100 50	1 pF to 390 pF 390 pF to 750 pF
CAC03	.260 (6.60)	.100 (2.54)	.020 (.51)	100 50	330 pF to 1000 pF 1000 pF to 2200 pF
CAC04	.270 (6.86)	.150 (3.81)	.020 (.51)	100 50	820 pF to 2200 pF 2200 pF to 4700 pF
CAC05	.400 (10.16)	.150 (3.81)	.025 (.64)	100 50	1000 pF to 4700 pF 4700 pF to 10,000 pF



PART NUMBERS AND ORDERING INFORMATION

CAC02 PART NUMBERS	CAC02 PART NUMBERS (cont'd.)	CAC03 PART NUMBERS	CAC04 PART NUMBERS (cont'd.)
<b>CAP. 100 VOLT</b> 1.0pF CAC02COG1R0 * 100A 1.5pF CAC02COG1R5 — 100A 2.2pF CAC02COG2R2 — 100A 2.7pF CAC02COG2R7 — 100A 3.0pF CAC02COG3R0 — 100A 3.3pF CAC02COG3R3 — 100A 3.6pF CAC02COG3R6 — 100A 3.9pF CAC02COG3R9 — 100A 4.3pF CAC02COG4R3 — 100A 4.7pF CAC02COG4R7 — 100A 5.1pF CAC02COG5R1 — 100A 5.6pF CAC02COG5R6 — 100A 6.2pF CAC02COG6R2 — 100A 6.8pF CAC02COG6R8 — 100A 7.5pF CAC02COG7R5 — 100A 8.2pF CAC02COG8R2 — 100A 9.1pF CAC02COG9R1 — 100A 10pF CAC02COG100 — 100A 11pF CAC02COG110 — 100A 12pF CAC02COG120 — 100A 13pF CAC02COG130 — 100A 15pF CAC02COG150 — 100A 16pF CAC02COG160 — 100A 18pF CAC02COG180 — 100A 20pF CAC02COG200 — 100A 22pF CAC02COG220 — 100A 24pF CAC02COG240 — 100A 27pF CAC02COG270 — 100A 30pF CAC02COG300 — 100A 33pF CAC02COG330 — 100A 36pF CAC02COG360 — 100A 39pF CAC02COG390 — 100A	<b>CAP. 100 VOLT</b> 43pF CAC02COG430 * 100A 47pF CAC02COG470 — 100A 51pF CAC02COG510 — 100A 56pF CAC02COG560 — 100A 62pF CAC02COG620 — 100A 68pF CAC02COG680 — 100A 75pF CAC02COG750 — 100A 82pF CAC02COG820 — 100A 91pF CAC02COG910 — 100A 100pF CAC02COG101 — 100A 110pF CAC02COG111 — 100A 120pF CAC02COG121 — 100A 130pF CAC02COG131 — 100A 150pF CAC02COG151 — 100A 160pF CAC02COG161 — 100A 180pF CAC02COG181 — 100A 200pF CAC02COG201 — 100A 220pF CAC02COG221 — 100A 240pF CAC02COG241 — 100A 270pF CAC02COG271 — 100A 300pF CAC02COG301 — 100A 330pF CAC02COG331 — 100A 360pF CAC02COG361 — 100A 390pF CAC02COG391 — 100A  <b>CAP. 50 VOLT</b> 430pF CAC02COG431 * 050A 470pF CAC02COG471 — 050A 510pF CAC02COG511 — 050A 560pF CAC02COG561 — 050A 620pF CAC02COG621 — 050A 680pF CAC02COG681 — 050A 750pF CAC02COG751 — 050A	<b>CAP. 100 VOLT</b> 430pF CAC03COG431 * 100A 470pF CAC03COG471 — 100A 510pF CAC03COG511 — 100A 560pF CAC03COG561 — 100A 620pF CAC03COG621 — 100A 680pF CAC03COG681 — 100A 750pF CAC03COG751 — 100A 820pF CAC03COG821 — 100A 910pF CAC03COG911 — 100A 1000pF CAC03COG102 — 100A  <b>CAP. 50 VOLT</b> 1100pF CAC03COG112 * 050A 1200pF CAC03COG122 — 050A 1300pF CAC03COG132 — 050A 1500pF CAC03COG152 — 050A 1600pF CAC03COG162 — 050A 1800pF CAC03COG182 — 050A 2000pF CAC03COG202 — 050A 2200pF CAC03COG222 — 050A  <b>CAC04 PART NUMBERS</b>  <b>CAP. 100 VOLT</b> 1100pF CAC04COG112 * 100A 1200pF CAC04COG122 — 100A 1300pF CAC04COG132 — 100A 1500pF CAC04COG152 — 100A 1600pF CAC04COG162 — 100A 1800pF CAC04COG182 — 100A 2000pF CAC04COG202 — 100A 2200pF CAC04COG222 — 100A	<b>CAP. 50 VOLT</b> 2400pF CAC04COG242 * 050A 2700pF CAC04COG272 — 050A 3000pF CAC04COG302 — 050A 3300pF CAC04COG332 — 050A 3600pF CAC04COG362 — 050A 3900pF CAC04COG392 — 050A 4300pF CAC04COG432 — 050A 4700pF CAC04COG472 — 050A  <b>CAC05 PART NUMBERS</b>  <b>CAP. 100 VOLT</b> 2400pF CAC05COG242 * 100A 2700pF CAC05COG272 — 100A 3000pF CAC05COG302 — 100A 3300pF CAC05COG332 — 100A 3600pF CAC05COG362 — 100A 3900pF CAC05COG392 — 100A 4300pF CAC05COG432 — 100A 4700pF CAC05COG472 — 100A  <b>CAP. 50 VOLT</b> 5100pF CAC05COG512 * 050A 5600pF CAC05COG562 — 050A 6200pF CAC05COG622 — 050A 6800pF CAC05COG682 — 050A 7500pF CAC05COG752 — 050A 8200pF CAC05COG822 — 050A 9100pF CAC05COG912 — 050A 10,000pF CAC05COG103 — 050A  * Insert letter for tolerance code. See part number explanation for values. Available tolerances are: 1.0 - 4.7 pF - C, D 5.1 - 12.0 pF - C, J, K 13 - 24 pF - C, G, J, K, M 27 pF - Up - F, G, J, K, M

PART MARKING



CGW — Corning Glass Works  
102 — Capacitance  
J — Tolerance  
1 — Voltage Rating Designator  
1 = 100V, 5 = 50V  
C — Temperature Characteristic,  
COG

PART NUMBER EXPLANATION

C	A	C	03	COG	102	J	100	A
Corning Ceramic Capacitor	Axial Leads	Conformal Coating	Case Size 02, 03, 04, 05	Temperature Characteristic 0±30 PPM/°C from -55°C to 125°C	Capacitance Value in pF. Two significant figures plus multiplier. 102 = 1000 pF. For fractional values below 10pF, R = decimal point, i.e. 1R5 indicates 1.5 pF.	Tolerance M = ±20% K = ±10% J = ±5% G = ±2% F = ±1% D = ±0.5pF C = ±0.25pF	Capacitance Voltage Rating Failure Rate 050 - 50 volt 100 - 100 volt A-not applicable.	

SOLID TANTALUM CAPACITORS

METAL FILM RESISTORS

PACKAGING



# Ceramic Capacitors

CORNING

CKR11, 12, 14 (QPL to MIL-C-39014/5)

Established Reliability

## APPLICATIONS

These miniature multilayer ceramic capacitors are QPL to Established Reliability specification MIL-C-39014/5. The dielectric is fused into a monolithic structure, which is then molded into a tough, flame retardant case, sized for automatic insertion. These units offer excellent frequency characteristics, superior voltage coefficients and high volumetric efficiency.

## PERFORMANCE CHARACTERISTICS

**Tolerance** —  $\pm 20\%$  and  $\pm 10\%$ .

**Stability Characteristics** — Available as follows:

BX — TC:  $\pm 15\%$ ; TVC: +15, -25%

BR — TC:  $\pm 15\%$ ; TVC: +15, -40%

**Dissipation Factor** — 2.5% maximum.

**Insulation Resistance** — At 25°C, 100,000 megohms or 1,000 megohm-microfarads. At 125°C, 10,000 megohms or 100 megohm-microfarads.

**Voltage/Temperature Ratings** — Voltage ratings are shown in the decade tables. The operating temperature range is -55°C to +125°C.

**Part Numbers** — Part numbers are formed by adding a dash number from the part number table to the basic mil spec number — M39014/05 — (add dash number)

### Examples:

M39014/05-2401

CKR11 10pF  $\pm 10\%$  100V

L Failure Rate (BX Characteristic)

M39014/05-2698

CKR14 100,000 pF  $\pm 20\%$  100V

M Failure Rate (BR Characteristic)

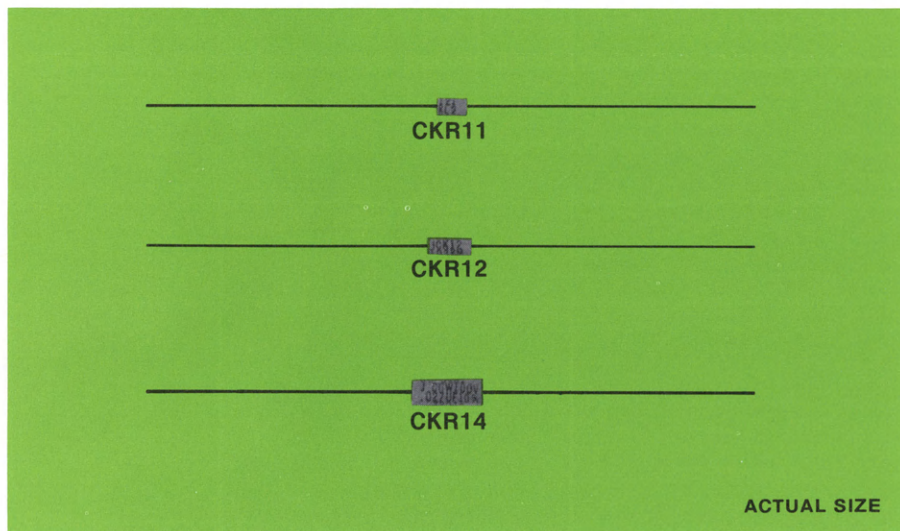
M39014/05-2862

CKR12 10,000 pF  $\pm 20\%$  100V

P Failure Rate (BX Characteristic)

### Cross-Reference Information

MIL-C-39014/5	MIL-C-11015/20
Style	Style
CKR11	CK12
CKR12	CK13
CKR14	CK14



ACTUAL SIZE

### Failure Rate (90% Confidence)

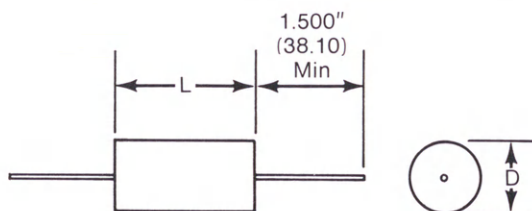
L = 2%/1000 Hours

M = 1%/1000 Hours

P = .1%/1000 Hours

R = .01%/1000 Hours

S = .001%/1000 Hours



### Dimensions — Inches (Millimeters)

Case Size	L $\pm .010$ ( $\pm .25$ )	D $\pm .010$ ( $\pm .25$ )	Lead Dia
CKR11	.160 (4.06)	.090 (2.29)	.016 $\pm$ .001 (.41 $\pm$ .03)
CKR12	.250 (6.35)	.090 (2.29)	.016 $\pm$ .001 (.41 $\pm$ .03)
CKR14	.390 (9.91)	.140 (3.56)	.025 $\pm$ .002 (.63 $\pm$ .05)

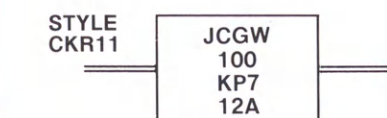
**Note** — Leads are solder coated Dumet.



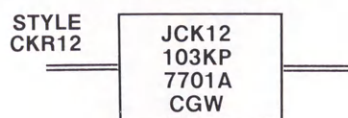
## PART NUMBERS AND ORDERING INFORMATION

M39014/05 — (Dash Number)					Capacitance Value (pF)	Capacitance Tolerance ± Percent	DC Rated Voltage	M39014/05 — (Dash Number)					Capacitance Value (pF)	Capacitance Tolerance ± Percent	DC Rated Voltage
Failure Rate Level — (%/1,000 hours)								Failure Rate Level — (%/1,000 hours)							
2.0(L)	1.0(M)	0.1(P)	0.01(R)	0.001(S)				2.0(L)	1.0(M)	0.1(P)	0.01(R)	0.001(S)			
Style CKR11 BX								Style CKR12 BX							
2401	2601	2801	2001	2201	10	10	100	2457	2657	2857	2057	2257	5600	10	100
2402	2602	2802	2002	2202	10	20	100	2458	2658	2858	2058	2258	6800	10	100
2403	2603	2803	2003	2203	12	10	100	2459	2659	2859	2059	2259	6800	20	100
2404	2604	2804	2004	2204	15	10	100	2460	2660	2860	2060	2260	8200	10	100
2405	2605	2805	2005	2205	15	20	100	2461	2661	2861	2061	2261	10000	10	100
2406	2606	2806	2006	2206	18	10	100	2462	2662	2862	2062	2262	10000	20	100
2407	2607	2807	2007	2207	22	10	100	2463	2663	2863	2063	2263	12000	10	50
2408	2608	2808	2008	2208	22	20	100	2464	2664	2864	2064	2264	15000	10	50
2409	2609	2809	2009	2209	27	10	100	2465	2665	2865	2065	2265	15000	20	50
2410	2610	2810	2010	2210	33	10	100	2466	2666	2866	2066	2266	18000	10	50
2411	2611	2811	2011	2211	33	20	100	2467	2667	2867	2067	2267	22000	10	50
2412	2612	2812	2012	2212	39	10	100	2468	2668	2868	2068	2268	22000	20	50
2413	2613	2813	2013	2213	47	10	100	2469	2669	2869	2069	2269	27000	10	50
2414	2614	2814	2014	2214	47	20	100	2470	2670	2870	2070	2270	33000	10	50
2415	2615	2815	2015	2215	56	10	100	2471	2671	2871	2071	2271	33000	20	50
2416	2616	2816	2016	2216	68	10	100	2472	2672	2872	2072	2272	39000	10	50
2417	2617	2817	2017	2217	68	20	100	2473	2673	2873	2073	2273	47000	10	50
2418	2618	2818	2018	2218	82	10	100	2474	2674	2874	2074	2274	47000	20	50
2419	2619	2819	2019	2219	100	10	100	Style CKR14 BX							
2420	2620	2820	2020	2220	100	20	100	2475	2675	2875	2075	2275	12000	10	100
2421	2621	2821	2021	2221	120	10	100	2476	2676	2876	2076	2276	15000	10	100
2422	2622	2822	2022	2222	150	10	100	2477	2677	2877	2077	2277	15000	20	100
2423	2623	2823	2023	2223	150	20	100	2478	2678	2878	2078	2278	18000	10	100
2424	2624	2824	2024	2224	180	10	100	2479	2679	2879	2079	2279	22000	10	100
2425	2625	2825	2025	2225	220	10	100	2480	2680	2880	2080	2280	22000	20	100
2426	2626	2826	2026	2226	220	20	100	2481	2681	2881	2081	2281	27000	10	100
2427	2627	2827	2027	2227	270	10	100	2482	2682	2882	2082	2282	33000	10	100
2428	2628	2828	2028	2228	330	10	100	2483	2683	2883	2083	2283	33000	20	100
2429	2629	2829	2029	2229	330	20	100	2484	2684	2884	2084	2284	39000	10	100
2430	2630	2830	2030	2230	390	10	100	2485	2685	2885	2085	2285	47000	10	100
2431	2631	2831	2031	2231	470	10	100	2486	2686	2886	2086	2286	47000	20	100
2432	2632	2832	2032	2232	470	20	100	2487	2687	2887	2087	2287	56000	10	50
2433	2633	2833	2033	2233	560	10	100	2488	2688	2888	2088	2288	68000	10	50
2434	2634	2834	2034	2234	680	10	100	2489	2689	2889	2089	2289	68000	20	50
2435	2635	2835	2035	2235	680	20	100	2490	2690	2890	2090	2290	82000	10	50
2436	2636	2836	2036	2236	820	10	100	2491	2691	2891	2091	2291	100000	10	50
2437	2637	2837	2037	2237	1000	10	100	2492	2692	2892	2092	2292	100000	20	50
2438	2638	2838	2038	2238	1000	20	100	Style CKR14 BR							
2439	2639	2839	2039	2239	1200	10	100	2493	2693	2893	2093	2293	56000	10	100
2440	2640	2840	2040	2240	1500	10	100	2494	2694	2894	2094	2294	68000	10	100
2441	2641	2841	2041	2241	1500	20	100	2495	2695	2895	2095	2295	68000	20	100
2442	2642	2842	2042	2242	1800	10	100	2496	2696	2896	2096	2296	82000	10	100
2443	2643	2843	2043	2243	2200	10	100	2497	2697	2897	2097	2297	100000	10	100
2444	2644	2844	2044	2244	2200	20	100	2498	2698	2898	2098	2298	100000	20	100
2445	2645	2845	2045	2245	2700	10	100	2499	2699	2899	2099	2299	120000	10	50
2446	2646	2846	2046	2246	3300	10	100	2500	2700	2900	2100	2300	150000	10	50
2447	2647	2847	2047	2247	3300	20	100	2501	2701	2901	2101	2301	150000	20	50
2448	2648	2848	2048	2248	3900	10	100	2502	2702	2902	2102	2302	180000	10	50
2449	2649	2849	2049	2249	4700	10	100	2503	2703	2903	2103	2303	220000	10	50
2450	2650	2850	2050	2250	4700	20	100	2504	2704	2904	2104	2304	220000	20	50
2451	2651	2851	2051	2251	5600	10	50	2505	2705	2905	2105	2305	270000	10	50
2452	2652	2852	2052	2252	6800	10	50								
2453	2653	2853	2053	2253	6800	20	50								
2454	2654	2854	2054	2254	8200	10	50								
2455	2655	2855	2055	2255	10000	10	50								
2456	2656	2856	2056	2256	10000	20	50								

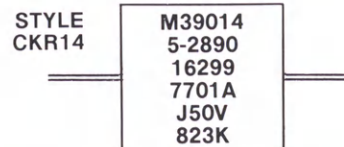
## PART MARKING



J — JAN Trademark  
 CGW — Corning Glass Works  
 100 — Capacitance, Code in pF (10pF)  
 K — Capacitance Tolerance ( $\pm 10\%$ )  
 P — Failure Rate Level  
 (.1%/1000 hrs.)  
 7 — Last Digit of Year  
 12 — Week of Year  
 A — Lot Code



J — JAN Trademark  
 CK — Style  
 12 — Size  
 103 — Capacitance (10,000pF)  
 K — Capacitance Tolerance ( $\pm 10\%$ )  
 P — Failure Rate Level  
 (.1%/1000 hrs.)  
 77 — Last 2 Digits of Year  
 01 — Week of Year  
 A — Lot Code  
 CGW — Corning Glass Works



M39014 — General Specification  
 5 — Specification Sheet  
 2890 — Dash Number  
 16299 — CGW ID Number  
 77 — Year  
 01 — Week  
 A — Lot Code  
 J — JAN Trademark  
 50V — Voltage Rating  
 823 — Coded Capacitance  
 K — Capacitance Tolerance



# Ceramic Capacitors

CORNING

CK12, 13, 14 (QPL to MIL-C-11015/20)

## APPLICATIONS

These miniature multilayer ceramic capacitors are QPL to MIL-C-11015/20. The unique dielectric provides high volumetric efficiency and superior reliability. The monolithic units are molded into rugged flame-retardant cases, ideally suited for automatic insertion.

## PERFORMANCE CHARACTERISTICS

**Tolerance** —  $\pm 20\%$  and  $\pm 10\%$ .

**Stability Characteristics** — Available as follows:

BX — TC:  $\pm 15\%$ ; TVC: +15, -25%

BR — TC:  $\pm 15\%$ ; TVC: +15, -40%

**Dissipation Factor** — 2.5% maximum @1 kHz.

**Life** — Meets or exceeds requirements of MIL-C-11015, 200% of rated voltage, 125°C, for 2,000 hours.

**Insulation Resistance** — 100,000 megohms or 1,000 megohm-microfarads.

**Voltage/Temperature Ratings** — Voltage ratings are shown in the decade table. The operating temperature range is -55°C to +125°C.

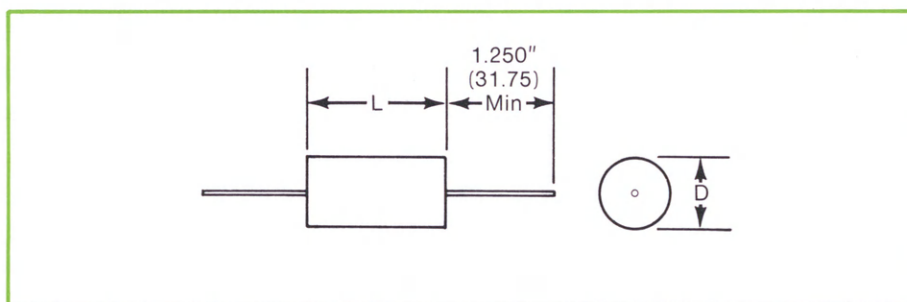
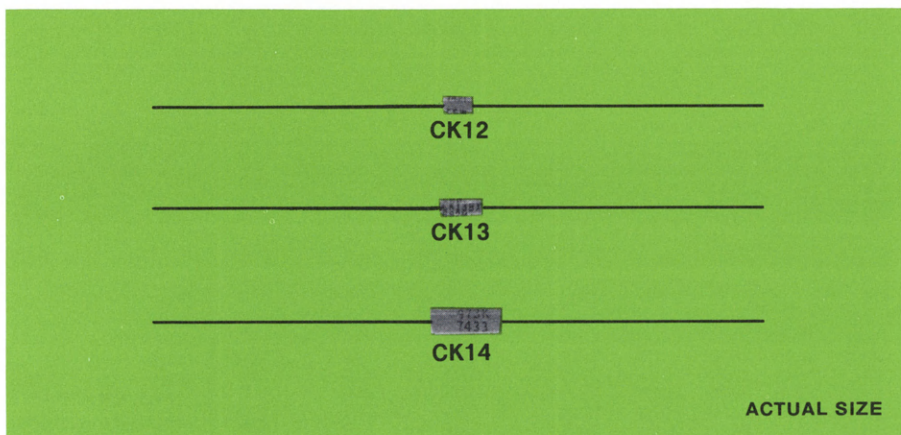
**Moisture Resistance** — Meets or exceeds requirements of MIL-C-11015 and MIL-STD-202, Method 106.

**Dielectric Withstanding Voltage** 250% of rated dc voltage.

**Part Numbers** — Part numbers are shown in the ordering information table. Use suffix "M" for  $\pm 20\%$  tolerance if available, and suffix "K" for  $\pm 10\%$  tolerance.

## Cross-Reference Information

MIL-C-11015/20	MIL-C-39014/5
Style	Style
CK12	CKR11
CK13	CKR12
CK14	CKR14



## Dimensions — Inches (Millimeters)

Case Size	L $\pm .010$ ( $\pm .25$ )	D $\pm .010$ ( $\pm .25$ )	Lead Dia. +.004(.10) -.001(.03)	Weight (Grams)
CK12	.160 (4.06)	.090 (2.29)	.016 (.41)	.2
CK13	.250 (6.35)	.090 (2.29)	.016 (.41)	.2
CK14	.390 (9.91)	.140 (3.56)	.025 (.63)	.5

**Note** — Leads are solder coated Dumet.

PART NUMBERS AND ORDERING INFORMATION

Capacitance Values (pF)	Military Type Designation	DC Working Voltage	Tolerances Available	Capacitance Values (pF)	Military Type Designation	DC Working Voltage	Tolerances Available
STANDARD VALUES CK12				STANDARD VALUES CK12 (con't.)			
10	CK12BX100 *	100	K,M	6800	CK12BX682 *	50	K,M
12	CK12BX120	100	K	8200	CK12BX822	50	K
15	CK12BX150	100	K,M	10000	CK12BX103	50	K,M
18	CK12BX180	100	K	STANDARD VALUES CK13			
22	CK12BX220	100	K,M	5600	CK13BX562 *	100	K
27	CK12BX270	100	K	6800	CK13BX682	100	K,M
33	CK12BX330	100	K,M	8200	CK13BX822	100	K
39	CK12BX390	100	K	10000	CK13BX103	100	K,M
47	CK12BX470	100	K,M	12000	CK13BX123	50	K
56	CK12BX560	100	K	15000	CK13BX153	50	K,M
68	CK12BX680	100	K,M	18000	CK13BX183	50	K
82	CK12BX820	100	K	22000	CK13BX223	50	K,M
100	CK12BX101	100	K,M	27000	CK13BR273	50	K
120	CK12BX121	100	K	33000	CK13BR333	50	K,M
150	CK12BX151	100	K,M	39000	CK13BR393	50	K
180	CK12BX181	100	K	47000	CK13BR473	50	K,M
220	CK12BX221	100	K,M	STANDARD VALUES CK14			
270	CK12BX271	100	K	12000	CK14BX123 *	100	K
330	CK12BX331	100	K,M	15000	CK14BX153	100	K,M
390	CK12BX391	100	K	18000	CK14BX183	100	K
470	CK12BX471	100	K,M	22000	CK14BX223	100	K,M
560	CK12BX561	100	K	27000	CK14BX273	100	K
680	CK12BX681	100	K,M	33000	CK14BX333	100	K,M
820	CK12BX821	100	K	39000	CK14BX393	100	K
1000	CK12BX102	100	K,M	47000	CK14BX473	100	K,M
1200	CK12BX122	100	K	56000	CK14BR563	100	K
1500	CK12BX152	100	K,M	68000	CK14BR683	100	K,M
1800	CK12BX182	100	K	82000	CK14BR823	100	K
2200	CK12BX222	100	K,M	100000	CK14BR104	100	K,M
2700	CK12BX272	100	K	120000	CK14BR124	50	K
3300	CK12BX332	100	K,M	150000	CK14BR154	50	K,M
3900	CK12BX392	100	K	180000	CK14BR184	50	K
4700	CK12BX472	100	K,M	220000	CK14BR224	50	K,M
5600	CK12BX562	50	K	270000	CK14BR274	50	K

\*Add letter for tolerance code above lines.

PART MARKING

CGW  
CK12BX  
103K  
7714

CGW — Corning Glass Works  
CK — Style  
12 — Case Size  
B — Operating Temperature Range  
X — Stability Characteristic  
103 — Capacitance  
K — Tolerance  
7714 — Date and Lot Code

MILITARY PART NUMBER EXPLANATION

CK

12

B

X

103

K

Style

Case Size  
12  
13  
14

Operating Temperature Range  
(-55°C to +125°C)

Stability Characteristic  
X — TC: ± 15%; TVC: + 15%, -25%  
R — TC: ± 15%; TVC: + 15%, -40%

Capacitance Tolerance  
K = ± 10%  
M = ± 20%

Capacitance Code is expressed in pico-farads (pF). The first two digits represent significant figures and the third digit specifies the number of zeros to follow; i.e. 103 indicates 10000 pF.

SOLID TANTALUM CAPACITORS

METAL FILM RESISTORS

PACKAGING



# GLASS-K™ Capacitors

CORNING

CKR31, 32 (QPL to MIL-C-39014/21)  
Established Reliability

## APPLICATIONS

These miniature multilayer ceramic capacitors, CORNING® style CKR31 and CKR32 are qualified to Established Reliability specification MIL-C-39014/21. High volumetric efficiency and reliable performance result from the special GLASS-K™ dielectric, which is fused into a compact monolithic structure, sized for automatic insertion. These capacitors are available in three different stability characteristics.

## PERFORMANCE CHARACTERISTICS

**Tolerance** —  $\pm 20\%$  and  $\pm 10\%$  in characteristics "U" and "V", and  $\pm 10\%$  and  $\pm 5\%$  in characteristic "T".

**Stability Characteristics** — Available as follows:

BT-TC: +2, -10%; TVC: +2, -10%  
BU-TC: +2, -15%; TVC: +2, -15%  
BV-TC: +20, -45%; TVC: +20, -50%

**Dissipation Factor:**

BT: < 1.0%  
BU: < 1.5%  
BV: < 3.0%

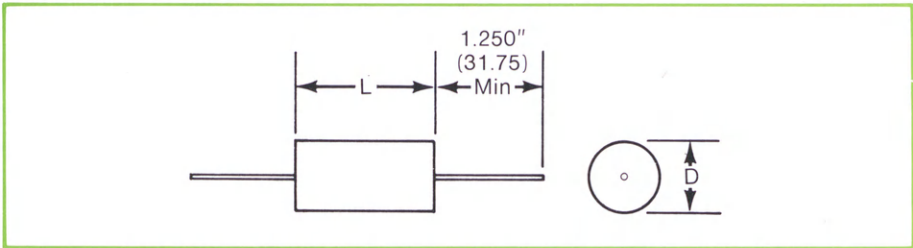
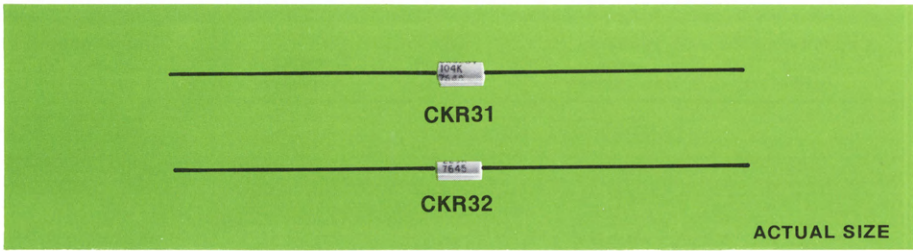
**Life** — Meets or exceeds requirements of MIL-C-39014. At 200% of rated voltage, 125°C, at 4000 hours, the capacitance change for each stability characteristic is as follows:

BT: < 5%  
BU: < 10%  
BV: < 20%

**Insulation Resistance** — At 25°C, 100,000 megohms or 1,000 megohm-microfarads. At 125°C, 10,000 megohms or 100 megohm-microfarads.

**Voltage/Temperature Ratings** — Rated voltage is 50 Vdc. The operating temperature range is -55°C to +125°C.

**Moisture Resistance** — Meets or exceeds requirements of MIL-C-39014 and MIL-STD-202, Method 106. The capacitance change is less than 2% for stability characteristics T and U, and less than 5% for characteristic V.



## Dimensions — Inches (Millimeters)

Case Size	L $\pm .010$ (.254)	D $\pm .010$ (.254)	Lead Dia.	Weight (Grams) (Typ)
			$+.004$ (.10) $-.001$ (.03)	
CKR31	.240 (6.09)	.090 (2.29)	.016 (.41)	.2
CKR32	.240 (6.09)	.130 (3.30)	.016 (.41)	.3

**Note:** Leads are gold-plated, solderable and weldable per MIL-STD-1276, Type D.

## Quick Selection Guide

Capacitance — pF	Style CKR	Stability Char.
270 — 10,000	31	BT
12,000 — 20,000	31 32	BU BT
22,000 — 39,000	31 32	BV BU
47,000 — 51,000	31	BV
56,000 — 100,000	32	BV

## PART NUMBERS AND ORDERING INFORMATION

M39014/21 (Dash Number)				M39014/21 (Dash Number)			
Failure Rate Level (%/1,000 hours) 1.0(M)	Capacitance Value (pF)	Capacitance Tolerance ± Percent	DC Rated Voltage	Failure Rate Level (%/1,000 hours) 1.0(M)	Capacitance Value (pF)	Capacitance Tolerance ± Percent	DC Rated Voltage
<b>Style CKR31 BT</b>				<b>Style CKR31 BV</b>			
0001	270	5	50	0049	22,000	10	50
0002	270	10	50	0050	22,000	20	50
0003	330	5	50	0051	27,000	10	50
0004	330	10	50	0052	27,000	20	50
0005	390	5	50	0053	33,000	10	50
0006	390	10	50	0054	33,000	20	50
0007	470	5	50	0055	39,000	10	50
0008	470	10	50	0056	39,000	20	50
0009	560	5	50	0057	47,000	10	50
0010	560	10	50	0058	47,000	20	50
0011	680	5	50	0059	51,000	10	50
0012	680	10	50	0060	51,000	20	50
0013	820	5	50	<b>Style CKR32 BT</b>			
0014	820	10	50	0061	12,000	5	50
0015	1000	5	50	0062	12,000	10	50
0016	1000	10	50	0063	15,000	5	50
0017	1200	5	50	0064	15,000	10	50
0018	1200	10	50	0065	18,000	5	50
0019	1500	5	50	0066	18,000	10	50
0020	1500	10	50	0067	20,000	5	50
0021	1800	5	50	0068	20,000	10	50
0022	1800	10	50	<b>Style CKR32 BU</b>			
0023	2200	5	50	0069	22,000	10	50
0024	2200	10	50	0070	22,000	20	50
0025	2700	5	50	0071	27,000	10	50
0026	2700	10	50	0072	27,000	20	50
0027	3300	5	50	0073	33,000	10	50
0028	3300	10	50	0074	33,000	20	50
0029	3900	5	50	0075	39,000	10	50
0030	3900	10	50	0076	39,000	20	50
0031	4700	5	50	<b>Style CKR32 BV</b>			
0032	4700	10	50	0077	56,000	10	50
0033	5600	5	50	0078	56,000	20	50
0034	5600	10	50	0079	62,000	10	50
0035	6800	5	50	0080	62,000	20	50
0036	6800	10	50	0081	68,000	10	50
0037	8200	5	50	0082	68,000	20	50
0038	8200	10	50	0083	75,000	10	50
0039	10000	5	50	0084	75,000	20	50
0040	10000	10	50	0085	82,000	10	50
<b>Style CKR31 BU</b>				0086	82,000	20	50
0041	12,000	10	50	0087	91,000	10	50
0042	12,000	20	50	0088	91,000	20	50
0043	15,000	10	50	0089	100,000	10	50
0044	15,000	20	50	0090	100,000	20	50
0045	18,000	10	50				
0046	18,000	20	50				
0047	20,000	10	50				
0048	20,000	20	50				

## PART MARKING

JCK31  
103KM  
7713A  
CGW

## PART NUMBER EXPLANATION

Part numbers are formed by adding a dash number from the part number table to the basic mil spec number — M39014/21 — (add dash number).  
Example:

M39014/21-0040  
CKR31 10,000pF ±10% 50V  
M Failure Rate (BT Characteristic)

## CROSS REFERENCE INFORMATION

MIL-C-39014/21 Style	MIL-C-11015/25 Style
CKR31	CK31
CKR32	CK32

J — JAN Trademark  
CK — Style  
31 — Case Size  
103 — Capacitance, Coded in pF  
K — Tolerance  
M — Failure Rate Level  
7713 — Date  
A — Lot Code  
CGW — Corning Glass Works

SOLID TANTALUM  
CAPACITORSMETAL FILM  
RESISTORS

PACKAGING



CYK01, 02 (INDUSTRIAL)  
CK31, 32 (QPL to MIL-C-11015/25)

APPLICATIONS

These miniature multilayer ceramic capacitors, CORNING® style CYK01 and CYK02, meet or exceed all requirements of MIL-C-11015/25. High volumetric efficiency and reliable performance result from the special GLASS-K™ dielectric, which is fused into a compact monolithic structure, sized for automatic insertion. Available in three different stability characteristics, these capacitors are suitable for both military and commercial applications in miniature circuitry.

PERFORMANCE CHARACTERISTICS

**Tolerance** — ±20% and ±10% in characteristics "U" and "V", and ±10% and ± 5% in characteristic "T".

**Stability Characteristics** — Available as follows:

- BT-TC: +2, -10%; TVC: +2, -10%
- BU-TC: +2, -15%; TVC: +2, -15%
- BV-TC: +20, -45%; TVC: +20, -50%

Dissipation Factor:

- BT: <1.0%
- BU: <1.5%
- BV: <3.0%

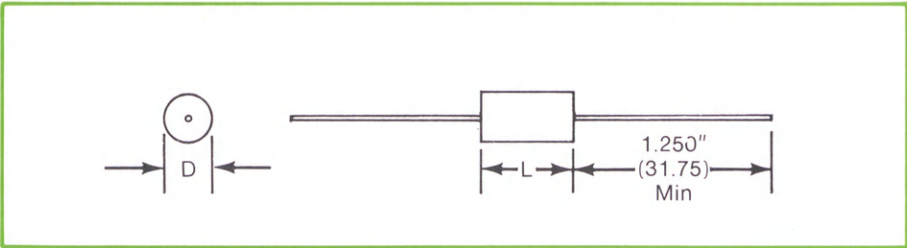
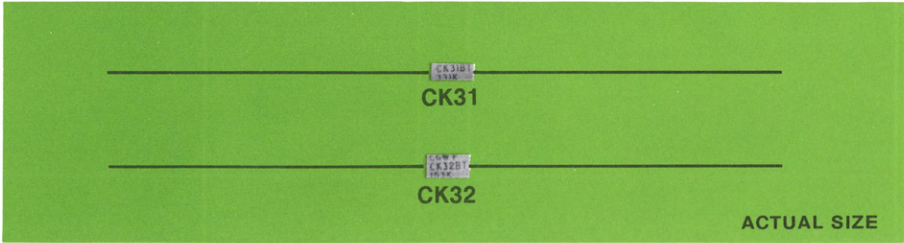
**Life** — Meets or exceeds requirements of MIL-C-11015. At 200% of rated voltage, 125°C, the capacitance change for each stability characteristic is as follows:

- BT: <2%
- BU: <5%
- BV: <20%

**Insulation Resistance** — 100,000 megohms or 1,000 megohm-microfarads, whichever is less.

**Voltage/Temperature Ratings** — Rated voltage is 50 Vdc. The operating temperature range is -55°C to +125°C.

**Moisture Resistance** — Meets or exceeds requirements of MIL-C-11015 and MIL-STD-202, Method 106. The capacitance change is less than 2% for stability characteristics T and U, and less than 5% for characteristic V.



Dimensions — Inches (Millimeters)

Case Size	L ±.010(.254)	D ±.010(.254)	Lead Dia. +.004 (.10) -.001 (.03)	WEIGHT (Grams) (Typ)
CK31	.240 (6.09)	.090 (2.29)	.016 (.41)	.2
CK32	.240 (6.09)	.130 (3.30)	.016 (.41)	.3

**Note:** Leads are gold-plated, solderable and weldable Dumet per MIL-STD-1276, Type D.

Quick Selection Guide

Capacitance — pF	Style CK	Stability Char.
270 — 10,000	31	BT
12,000 — 20,000	31 32	BU BT
22,000 — 39,000	31 32	BV BU
47,000 — 51,000	31	BV
56,000 — 100,000	32	BV

Capacitance Value (pF)	Corning Part No.	Military Type Designation	DC Working Voltage	Tolerances Available	Capacitance Value (pF)	Corning Part No.	Military Type Designation	DC Working Voltage	Tolerances Available				
STANDARD VALUES CK31					STANDARD VALUES CK31 (Con't.)								
270	CYK01BT271	— *	CK31BT271	— *	50	J, K	22000	CYK01BV223	— *	CK31BV223	— *	50	K, M
330	CYK01BT331	—	CK31BT331	—	50	J, K	27000	CYK01BV273	—	CK31BV273	—	50	K, M
390	CYK01BT391	—	CK31BT391	—	50	J, K	33000	CYK01BV333	—	CK31BV333	—	50	K, M
470	CYK01BT471	—	CK31BT471	—	50	J, K	39000	CYK01BV393	—	CK31BV393	—	50	K, M
560	CYK01BT561	—	CK31BT561	—	50	J, K	47000	CYK01BV473	—	CK31BV473	—	50	K, M
680	CYK01BT681	—	CK31BT681	—	50	J, K	51000	CYK01BV513	—	CK31BV513	—	50	K, M
820	CYK01BT821	—	CK31BT821	—	50	J, K	STANDARD VALUES CK32						
1000	CYK01BT102	—	CK31BT102	—	50	J, K							
1200	CYK01BT122	—	CK31BT122	—	50	J, K							
1500	CYK01BT152	—	CK31BT152	—	50	J, K							
1800	CYK01BT182	—	CK31BT182	—	50	J, K							
2200	CYK01BT222	—	CK31BT222	—	50	J, K	12000	CYK02BT123	— *	CK32BT123	— *	50	J, K
2700	CYK01BT272	—	CK31BT272	—	50	J, K	15000	CYK02BT153	—	CK32BT153	—	50	J, K
3300	CYK01BT332	—	CK31BT332	—	50	J, K	18000	CYK02BT183	—	CK32BT183	—	50	J, K
3900	CYK01BT392	—	CK31BT392	—	50	J, K	20000	CYK02BT203	—	CK32BT203	—	50	J, K
4700	CYK01BT472	—	CK31BT472	—	50	J, K	22000	CYK02BU223	— *	CK32BU223	— *	50	K, M
5600	CYK01BT562	—	CK31BT562	—	50	J, K	27000	CYK02BU273	—	CK32BU273	—	50	K, M
6800	CYK01BT682	—	CK31BT682	—	50	J, K	33000	CYK02BU333	—	CK32BU333	—	50	K, M
8200	CYK01BT822	—	CK31BT822	—	50	J, K	39000	CYK02BU393	—	CK32BU393	—	50	K, M
10000	CYK01BT103	—	CK31BT103	—	50	J, K	STANDARD VALUES CK33						
12000	CYK01BU123	— *	CK31BU123	— *	50	K, M	56000	CYK02BV563	— *	CK32BV563	— *	50	K, M
15000	CYK01BU153	—	CK31BU153	—	50	K, M	68000	CYK02BV683	—	CK32BV683	—	50	K, M
18000	CYK01BU183	—	CK31BU183	—	50	K, M	82000	CYK02BV823	—	CK32BV823	—	50	K, M
20000	CYK01BU203	—	CK31BU203	—	50	K, M	100000	CYK02BV104	—	CK32BV104	—	50	K, M

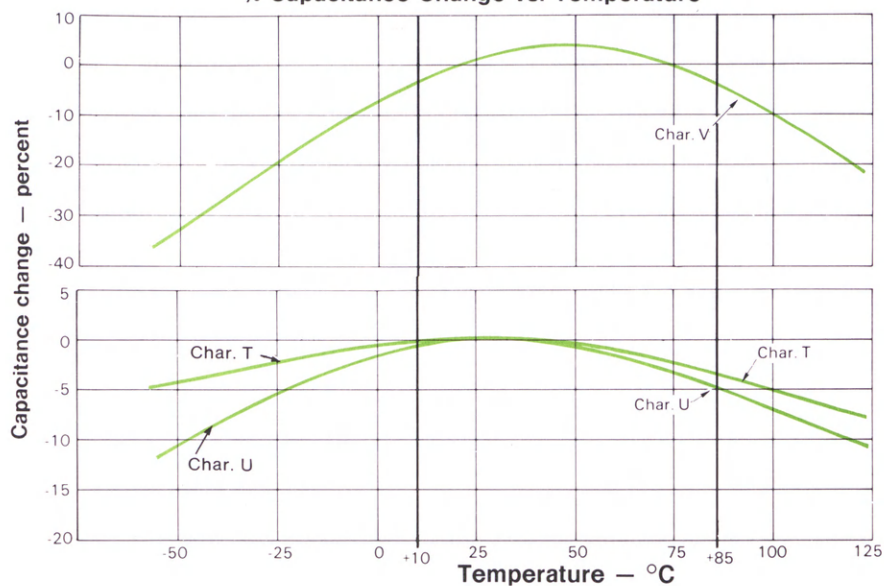
# SOLID TANTALUM CAPACITORS

Capacitance Code expressed in picofarads (pF).  
The first two digits represent significant figures and  
the third digit specifies the number of zeros to  
follow: i.e. 103 indicates 10,000 pF.

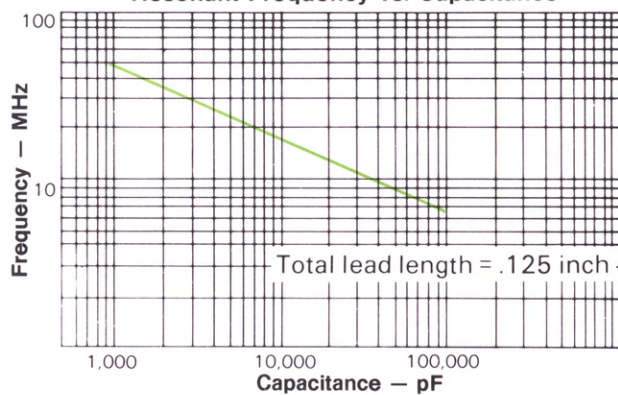


## GLASS-K™ CAPACITOR PERFORMANCE CURVES

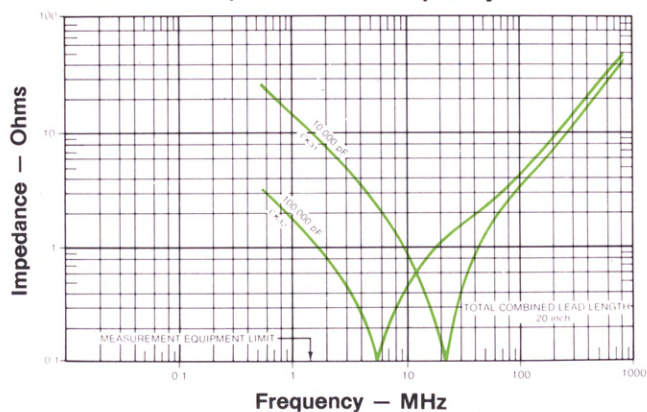
% Capacitance Change vs. Temperature



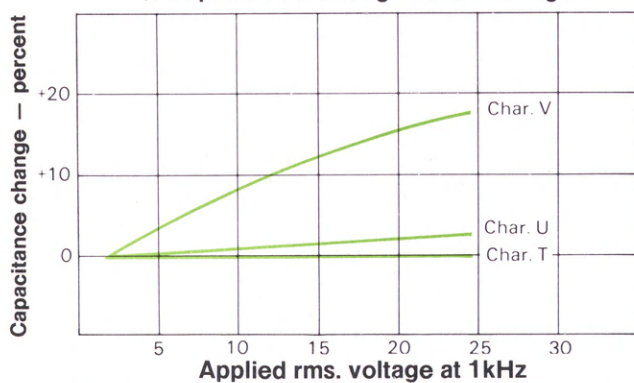
Resonant Frequency vs. Capacitance



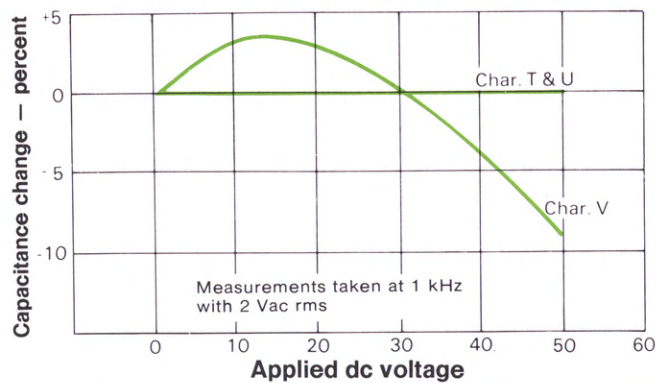
Impedance vs. Frequency



% Capacitance Change vs. ac Voltage

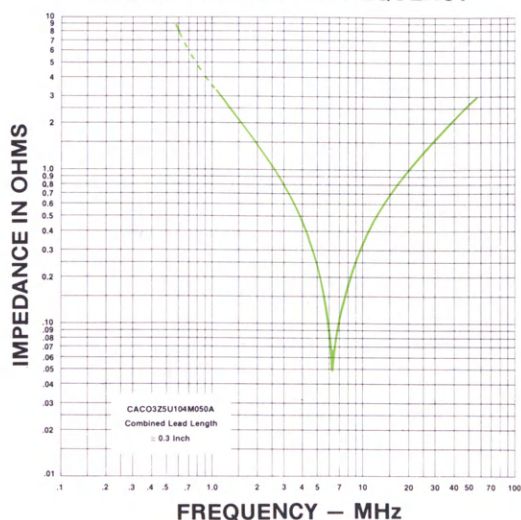


% Capacitance Change vs. dc Voltage

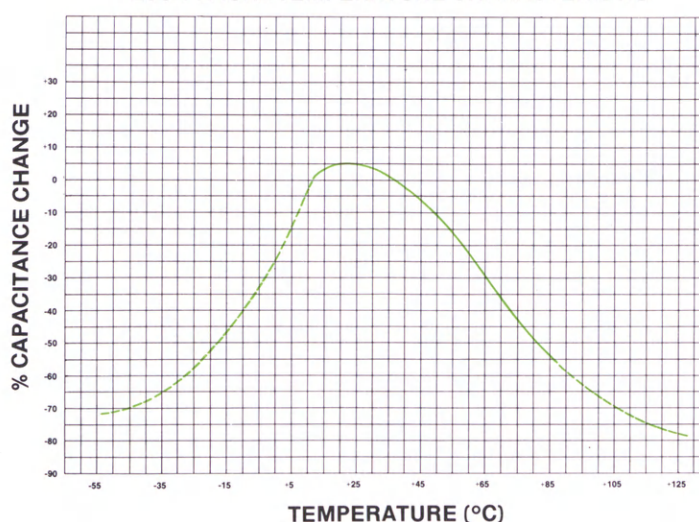


## CERAMIC CAPACITOR PERFORMANCE CURVES

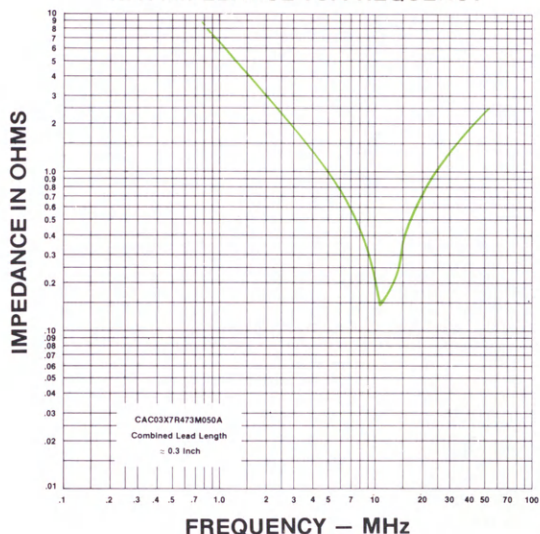
### Z5U IMPEDANCE VS. FREQUENCY



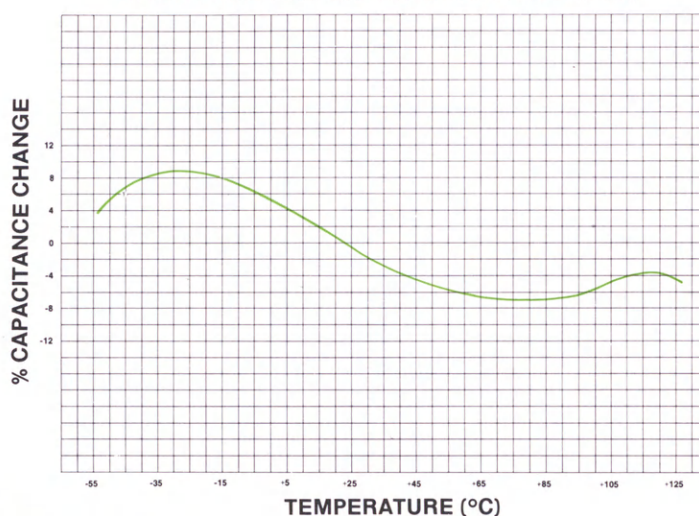
### Z5U TYPICAL TEMPERATURE CHARACTERISTIC



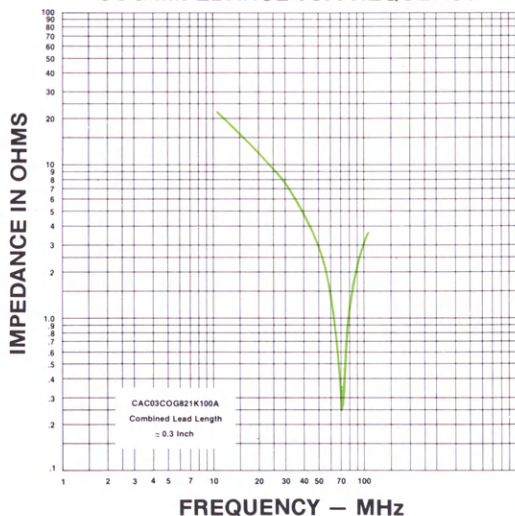
### X7R IMPEDANCE VS. FREQUENCY



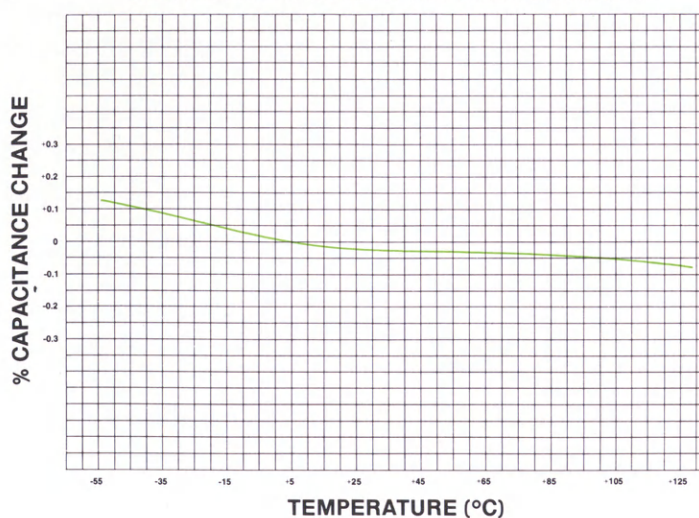
### X7R TYPICAL TEMPERATURE CHARACTERISTIC



### COG IMPEDANCE VS. FREQUENCY



### COG TYPICAL TEMPERATURE CHARACTERISTIC





# Introduction to Solid Tantalum Capacitors

CORNING

CORNING® solid tantalum capacitors are manufactured by Components, Incorporated, a wholly owned subsidiary of Corning Glass Works.

Corning offers a broad line of micro-miniature solid tantalum capacitors which are available in a variety of shapes, sizes, and styles.

The microminiature MINITAN® capacitors, encased in polyester sleeves and sealed with special moisture-resistant, epoxy resin, are used where space is a premium. A very favorable capacitance to volume ratio makes them especially well suited for high-density applications. Both the cylin-

drical Cordwood series and the rectangular Modular series are available in both polar and non-polar construction with either axial or radial leads.

The MC series microminiature chip capacitors, whose solder coating makes them suitable for reflow solder mounting, are designed specifically for hybrid, thick film, and microcircuit applications where mounting space is critical and conventionally packaged capacitors may not be used. These polar tantalum chips are available in six basic case sizes.

The MINIDIP MD series features sub-

miniature tantalum anodes, sealed in high stability moisture resistant epoxy. These radial leaded capacitors offer subminiature size and superior performance and are specifically intended for commercial and industrial applications.

**Specials Capability** — Corning has the capability to prototype and produce solid tantalum capacitors in speciality configurations. Contact Customer Engineering in Biddeford, Maine for special product needs.

## PERFORMANCE CURVES FOR SOLID TANTALUM CAPACITORS

**Ripple Voltage vs Temperature and Frequency** — Ripple voltage must be limited to keep internal heating within allowable limits. Maximum ripple voltage vs frequency is specified in the curves on the product pages. For 125°C rated products, linearly derate the maximum ripple voltage above 25°C to 33% at 125°C. For 85°C rated products, linearly derate the maximum ripple voltage above 25°C to 60% at 85°C.

**Impedance vs Frequency** — Typical impedance vs frequency curves are

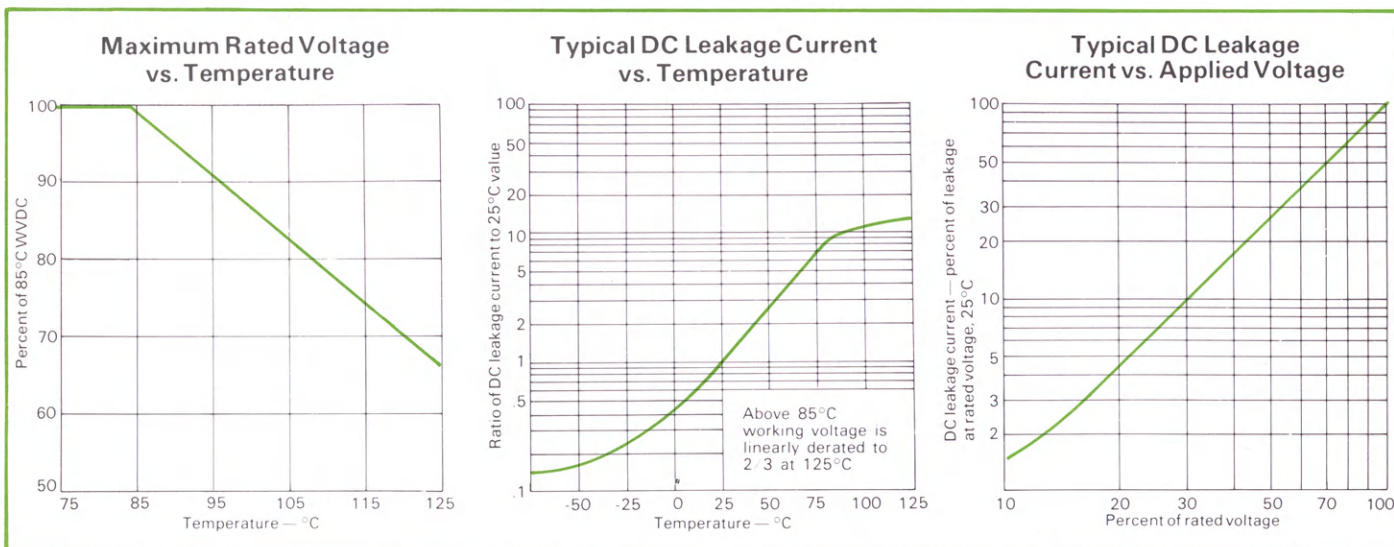
shown on the product pages. At the higher frequencies it is necessary to correct for resistance and reactance of the measuring equipment to achieve valid results.

**WVDC vs Temperature** — The product tables specify working voltage at ambient temperatures up to 85°C. Above 85°C, working voltage must be linearly derated to  $\frac{2}{3}$  WVDC at 125°C for those products rated for 125°C operation.

**DC Leakage vs Temperature and Voltage** — In general, DCL increases

with an increase in either temperature or voltage. The characteristic is quite similar for all solid tantalum capacitors; thus, the normalized curves can be used quite successfully. Since product leakage specifications are referenced to rated WVDC and 25°C, the curves are normalized with respect to this value. The curves show typical leakage at various voltages and temperatures with respect to the actual value at 25°C and rated WVDC.

Performance curves are continued on page 48.



## SOLID TANTALUM CAPACITORS

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### For the following:

- Placement of orders
- Price quotations
- Delivery
- Specifications or drawing reviews
- Samples
- Location of a franchised distributor

### Contact:

#### Customer Service

Components, Incorporated  
313 Elm Street  
Biddeford, ME 04005  
(207) 282-5111  
TWX — 710-229-1550

- Technical information  
Product capabilities  
Applications assistance

#### Customer Engineering

Components, Incorporated  
313 Elm Street  
Biddeford, ME 04005  
(207) 282-5111  
TWX — 710-229-1550



# Solid Tantalum Capacitors

CORNING

## SUBMINIATURE MINITAN® MODULAR MM SERIES

### FOR FILTERING • COUPLING • BY-PASSING • TIMING

CORNING® solid tantalum capacitors are manufactured by Components Incorporated, a wholly owned subsidiary of Corning Glass Works.

These precision, microminiature polar capacitors are suitable for general filtering, coupling, by-passing, and noncritical RC timing applications to +85°C without derating and to +125°C with derating to ½ WVDC (Except MMW case size). Very favorable capacitance to volume ratios make them especially well suited to high density applications such as found in avionics systems, subminiature communications equipment, and thick film circuitry.

### PERFORMANCE CHARACTERISTICS

**Capacitance** — Measured at +25°C and 120Hz on a polarized capacitance bridge with a maximum polarizing voltage of 2.2 vdc and a maximum ac signal of 1.0 volts rms.

**Tolerance** — Except for the MMW and MMU case sizes, standard tolerance is ±20% with ±10% or ±5% tolerance available in all case sizes (±5% tolerance available for capacitance values of .01MFD or greater). 10% capacitance decade values are offered in ±10% or ±5% tolerance.

**Dissipation Factor** — Measured simultaneously with capacitance as above. See Part Number Table for maximum +25°C, 120 Hz values.

**DC Leakage Current** — With rated WVDC applied through a 1000 ohm resistor for a maximum of 5 minutes, at 25°C. DCL values in µA will not exceed those shown in the part number section.

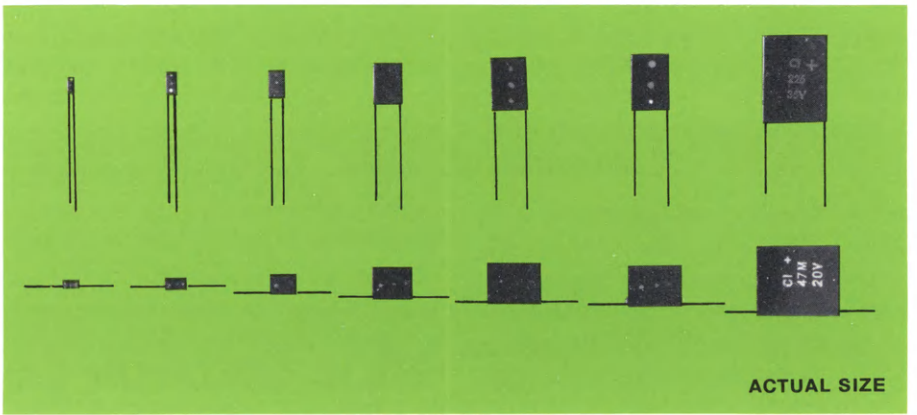
- at 85°C — 10 times the value
- at 125°C — 15 times the value at (½ rated voltage).

**Operating Voltage** — Capacitors will operate reliably up to rated WVDC at +85°C and to +125°C with linear derating to ½ WVDC (With the exception of the MMW case size which is limited to +85°C operation). Capacitors will withstand peak voltages in the reverse direction equal to 15% of the dc rating at +25°C, 10% at +55°C, and 5% at +85°C. Ac ripple voltage should be limited so that the forward dc voltage plus peak ac voltage does not exceed rated WVDC.

**Surge Voltage** — At +85°C and at 60-second intervals, capacitors withstand 1000 30-second applications at 130% rated WVDC.

**Temperature** — No derating is required between -55°C and +85°C. Between +85°C and +125°C, derate linearly to ½ WVDC (With the exception of the MMW case size which is limited to +85°C operation).

**Moisture Resistance** — Following Method 106, MIL-STD-202 testing, capacitors will meet initial dc leakage requirements. Capacitance will be within ±10% of initial values.



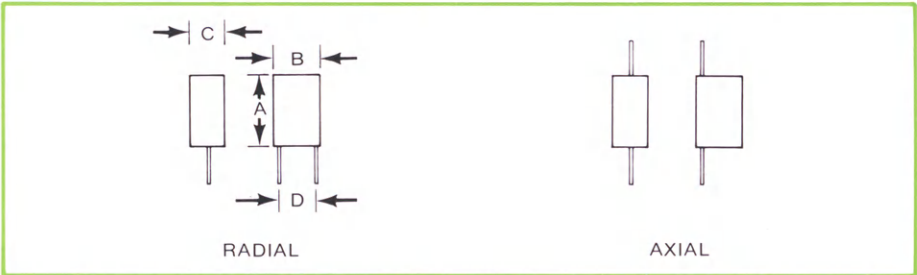
**Life Test** — After 2000 hours at +85°C with rated WVDC applied, capacitors will meet initial dc leakage and DF requirements. Capacitance will not change more than ±10% from original values.

### MECHANICAL

**Construction** — Tantalum pellets are encased in polyester sleeves and sealed with a special moisture resistant epoxy resin. This rugged, fully insulated package withstands a one minute application of a 100

volt potential applied between the leads shorted together and an encircling metal foil envelope.

**Leads** — Leads are solder coated (W case size leads are gold plated) pure nickel wire suitable for soldering or welding. Tested in accordance with MIL-C-55365, .007 diameter leads withstand an 8 oz. pull, .010 diameter leads a 1 lb. pull, and .016 diameter leads a 3 lb. pull. All lead diameters withstand 5 rotations twist. Ribbon leads are available.

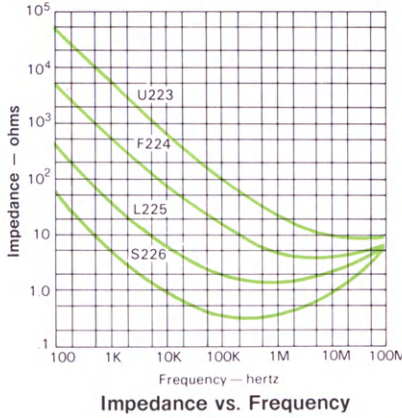
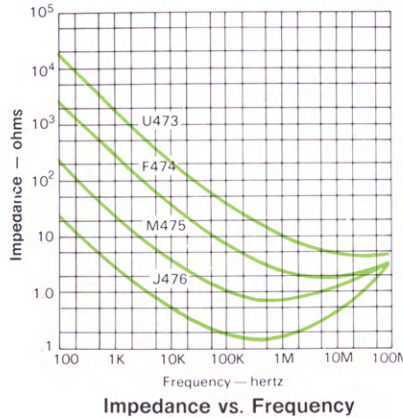
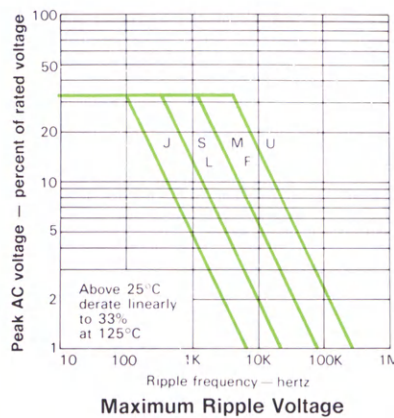


### Dimensions — Inches (Millimeters)

Case Size	A Max.	B Max.	C Max.	D
MMW	.100 (2.54)	.050 (1.27)	.040 (1.02)	.030 (.76) ± .015 (± .38)
MMU	.125 (3.18)	.070 (1.78)	.040 (1.02)	.050 (1.27) ± .015 (± .38)
MMF	.165 (4.19)	.120 (3.05)	.070 (1.78)	.100 (2.54) ± .020 (± .51)
MMM	.225 (5.72)	.185 (4.70)	.075 (1.91)	.150 (3.81) ± .020 (± .51)
MML	.290 (7.37)	.220 (5.59)	.110 (2.79)	.180 (4.57) ± .025 (± .64)
MMS	.310 (7.87)	.230 (5.84)	.130 (3.30)	.200 (5.08) ± .025 (± .64)
MMJ	.475 (12.07)	.375 (9.53)	.150 (3.81)	.300 (7.62) ± .025 (± .64)

**Leads:** W leads are 33 AWG, .007 ±.001 (.18 ±.025) diameter  
U, F, M leads are 30 AWG, .010 ±.002 (.25 ±.051) diameter  
L, S, J leads are 26 AWG, .016 ±.002 (.41 ±.051) diameter  
All anode leads are 1.625 ±.125 (41.3 ±3.18) long  
All cathode leads are 1.375 ±.125 (34.9 ±3.18) long





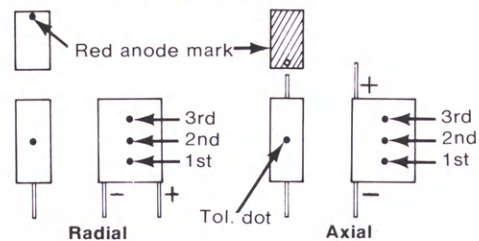
PART NUMBERS AND ORDERING INFORMATION

P/N	μF Cap.	Max. WVDC	Max. % DF	Max. DCL	P/N	μF Cap.	Max. WVDC	Max. % DF	Max. DCL	P/N	μF Cap.	Max. WVDC	Max. % DF	Max. DCL
<b>W Case Size</b> Std. Cap. Tol. +40% -20%					<b>F Case Size</b> Std. Cap. Tol. ±20%					<b>L Case Size</b> Std. Cap. Tol. ±20%				
MMW-020-472	.0047	20	10	0.5	MMF-035-472	.0047	35	6	0.5	MML-035-225	2.2	35	6	2.0
MMW-020-682	.0068	20	10	0.5	MMF-035-682	.0068	35	6	0.5	MML-035-335	3.3	35	6	2.0
MMW-020-103	.010	20	10	0.5	MMF-035-103	.010	35	6	0.5	MML-035-475	4.7	35	6	2.0
MMW-020-153	.015	20	10	0.5	MMF-035-153	.015	35	6	0.5	MML-025-685	6.8	25	6	2.0
MMW-020-223	.022	20	10	0.5	MMF-035-223	.022	35	6	0.5	MML-020-106	10	20	6	2.0
MMW-020-333	.033	20	10	0.5	MMF-035-333	.033	35	6	0.5	MML-015-156	15	15	6	2.0
MMW-020-473	.047	20	10	0.5	MMF-035-473	.047	35	6	0.5	MML-010-226	22	10	6	2.0
MMW-020-683	.068	20	10	0.5	MMF-035-683	.068	35	6	0.5	MML-006-336	33	6	6	2.0
MMW-015-104	.10	15	10	0.5	MMF-035-104	.10	35	6	0.5	MML-004-476	47	4	8	2.0
MMW-010-154	.15	10	10	0.5	MMF-035-154	.15	35	6	0.5	<b>S Case Size</b> Std. Cap. Tol. ±20%				
MMW-006-224	.22	6	10	0.5	MMF-035-224	.22	35	6	0.5	MMS-035-685	6.8	35	6	3.0
MMW-004-334	.33	4	10	0.5	MMF-035-334	.33	35	6	0.5	MMS-025-106	10	25	6	3.0
MMW-002-474	.47	2	10	0.5	MMF-035-474	.47	35	6	0.5	MMS-020-156	15	20	6	3.0
<b>U Case Size</b> Std. Cap. Tol. +40% -20%					MMF-025-684	.68	25	6	0.5	MMS-015-226	22	15	6	3.0
MMU-020-102	.0010	20	6	0.5	MMF-020-105	1.0	20	6	0.5	MMS-010-336	33	10	6	3.0
MMU-020-152	.0015	20	6	0.5	MMF-015-155	1.5	15	6	0.5	MMS-006-476	47	6	6	3.0
MMU-020-222	.0022	20	6	0.5	MMF-010-225	2.2	10	6	0.5	MMS-004-686	68	4	8	3.0
MMU-020-332	.0033	20	6	0.5	MMF-006-335	3.3	6	6	0.5	<b>J Case Size</b> Std. Cap. Tol. ±20%				
MMU-020-472	.0047	20	6	0.5	MMF-004-475	4.7	4	8	0.5	MMJ-035-106	10	35	6	9.0
MMU-020-682	.0068	20	6	0.5	MMF-003-685	6.8	3	10	0.5	MMJ-035-156	15	35	6	9.0
MMU-020-103	.010	20	6	0.5	MMF-002-106	10	2	10	0.5	MMJ-035-226	22	35	6	9.0
MMU-020-153	.015	20	6	0.5	<b>M Case Size</b> Std. Cap. Tol. ±20%					MMJ-025-336	33	25	6	9.0
MMU-020-223	.022	20	6	0.5	MMM-035-684	.68	35	6	1.0	MMJ-020-476	47	20	8	9.0
MMU-020-333	.033	20	6	0.5	MMM-035-105	1.0	35	6	1.0	MMJ-015-686	68	15	8	9.0
MMU-020-473	.047	20	6	0.5	MMM-035-155	1.5	35	6	1.0	MMJ-010-107	100	10	8	9.0
MMU-020-683	.068	20	6	0.5	MMM-025-225	2.2	25	6	1.0	MMJ-006-157	150	6	10	9.0
MMU-020-104	.10	20	6	0.5	MMM-020-335	3.3	20	6	1.0	MMJ-003-227	220	3	15	9.0
MMU-020-154	.15	20	6	0.5	MMM-020-475	4.7	20	6	1.0					
MMU-020-224	.22	20	6	0.5	MMM-010-685	6.8	10	6	1.0					
MMU-015-334	.33	15	6	0.5										
MMU-010-474	.47	10	6	0.5										
MMU-006-684	.68	6	6	0.5										

\*Add "A" — for Axial leads, "R" — for Radial leads      \*\*Add tolerance symbol from Part Number Explanation.

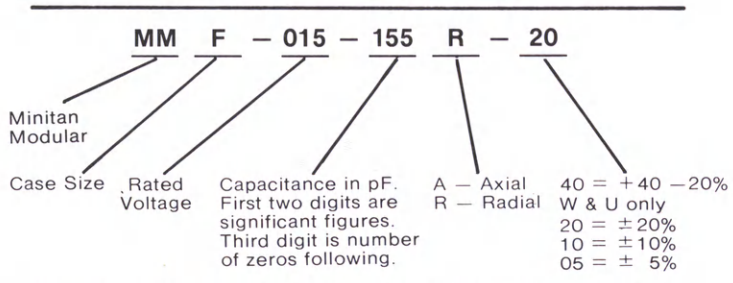
PART MARKING

MMJ case size is type marked, all others are color coded.



<b>EIA COLOR DOT CODING</b>			
0 Black (omitted)	1 Brown	2 Red	
3 Orange	4 Yellow	5 Green	
6 Blue	7 Violet	8 Gray	
9 White			

PART NUMBER EXPLANATION



Capacitance value is shown by means of standard EIA color code dots except for the MMJ case size where all data is printed. Because the polyester cases are black, black dots are omitted. ±10% tolerance is indicated by a silver dot. ±5% tolerance by a gold dot. No tolerance dot is used for ±20% or +40 -20%.

METAL FILM RESISTORS

PACKAGING



# Solid Tantalum Capacitors

CORNING

## SUBMINIATURE MINITAN® CORDWOOD MZ SERIES

FOR FILTERING • COUPLING • BY-PASSING • TIMING

CORNING® solid tantalum capacitors are manufactured by Components Incorporated, a wholly owned subsidiary of Corning Glass Works.

These precision, microminiature polar capacitors are suitable for general filtering, coupling, by-passing, and noncritical RC timing applications to +85°C without derating and to +125°C with derating to ⅓ WVDC. Very favorable capacitance to volume ratios make them especially well suited to high density applications such as found in avionics systems, subminiature communications equipment, and thick film circuitry.

### PERFORMANCE CHARACTERISTICS

**Capacitance** — Measured at +25°C and 120Hz on a polarized capacitance bridge with a maximum polarizing voltage of 2.2 vdc and a maximum ac signal of 1.0 volts rms.

**Tolerance** — Except for the MZY and MZP case sizes, standard tolerance is ±20% with ±10% or ±5% tolerance available in all case sizes. (±5% tolerance available for capacitance values of .01MFD or greater). 10% capacitance decade values are offered in ±10% or ±5% tolerance.

**Dissipation Factor** — Measured simultaneously with capacitance as above. See Part Number Section for maximum +25°C, 120Hz values.

**DC Leakage Current** — With rated WVDC applied through a 1000 ohm resistor for a maximum of 5 minutes, at 25°C. DCL values in µA will not exceed those shown in the part number section.

at 85°C — 10 times the value

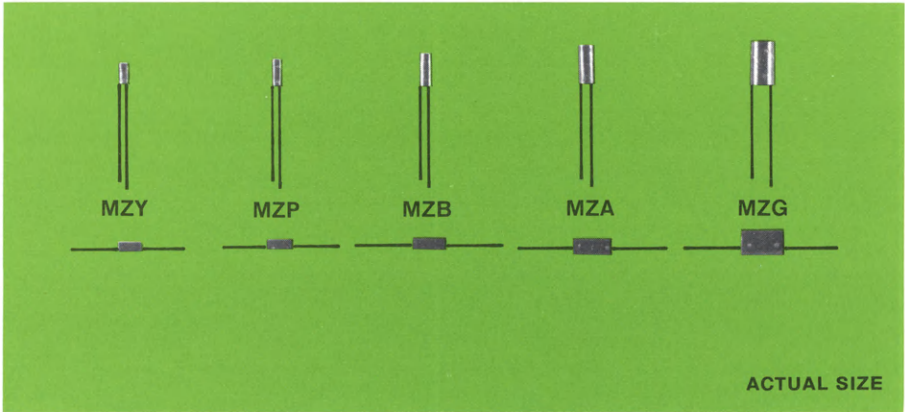
at 125°C — 15 times the value (at ⅓ rated voltage).

**Operating Voltage** — Capacitors will operate reliably up to rated WVDC at +85°C and to +125°C with linear derating to ⅓ WVDC. Capacitors will withstand peak voltages in the reverse direction equal to 15% of the dc rating at +25°C, 10% at +55°C, and 5% at +85°C. Ac ripple voltage should be limited so that the forward dc voltage plus peak ac voltage does not exceed rated WVDC.

**Surge Voltage** — At +85°C and at 60-second intervals, capacitors withstand 1000 30-second applications of 130% rated WVDC.

**Temperature** — No derating is required between -55°C and +85°C. Between +85°C and +125°C, derate linearly to ⅓ WVDC.

**Moisture Resistance** — Following Method 106, MIL-STD-202 testing, capacitors will meet initial dc leakage requirements. Capacitance will be within ±10% of initial values.



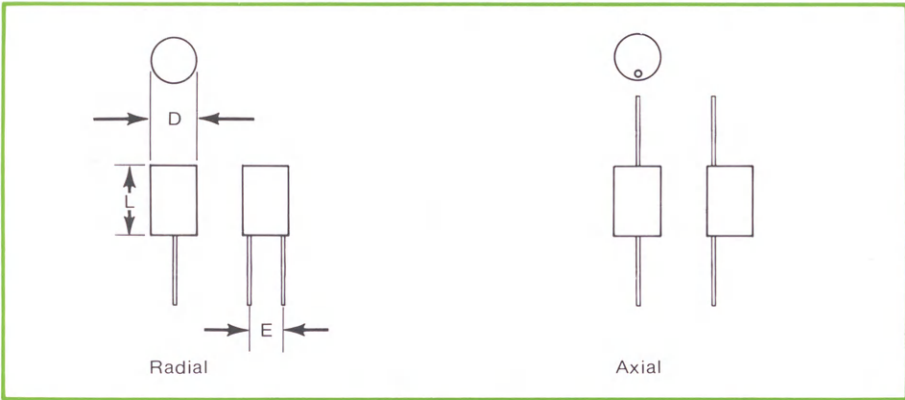
**Life Test** — After 2000 hours at +85°C with rated WVDC applied, capacitors will meet initial dc leakage and DF requirements. Capacitance will not change more than ±10% from original values.

### MECHANICAL

**Construction** — Tantalum pellets are encased in polyester sleeves and sealed with a special moisture resistant epoxy resin. This rugged, fully insulated package with-

stands a one minute application of a 100 volt potential applied between the leads shorted together and an encircling metal foil envelope.

**Leads** — Leads are solder coated pure nickel wire suitable for soldering or welding. Tested in accordance with MIL-C-55365, .010 diameter leads withstand a 1 lb. pull and .016 diameter leads a 3 lb. pull. All lead diameters withstand 5 rotations twist.

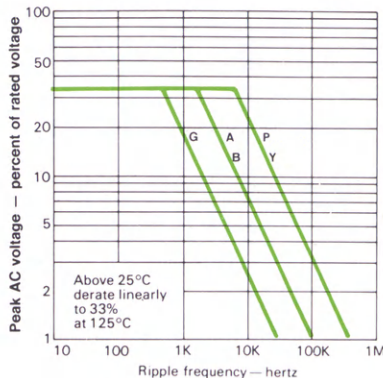


### Dimensions — Inches (Millimeters)

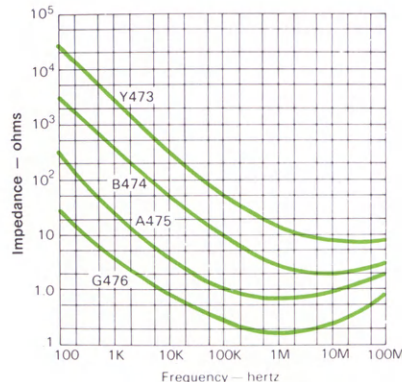
Case Size	L Max.	D Max.	E
MZY	.125 (3.18)	.070 (1.78)	.050 (1.27) ±.015 (±.38)
MZP	.160 (4.06)	.070 (1.78)	.050 (1.27) ±.015 (±.38)
MZB	.200 (5.08)	.080 (2.03)	.050 (1.27) ±.015 (±.38)
MZA	.225 (5.72)	.100 (2.54)	.070 (1.78) ±.020 (±.51)
MZG	.250 (6.35)	.150 (3.81)	.120 (3.05) ±.025 (±.64)

**Leads:** Y, P, B, A leads are 30 AWG, .010 ±.002 (.25 ±.051) Diameter  
G leads are 26 AWG, .016 ±.002 (.41 ±.051) Diameter  
All anode leads are 1.625 ±.125 (41.3 ±3.18) Long  
All cathode leads are 1.375 ±.125 (34.9 ±3.18) Long

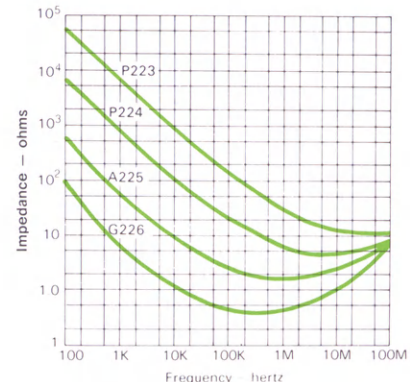




Maximum Ripple Voltage



Impedance vs. Frequency



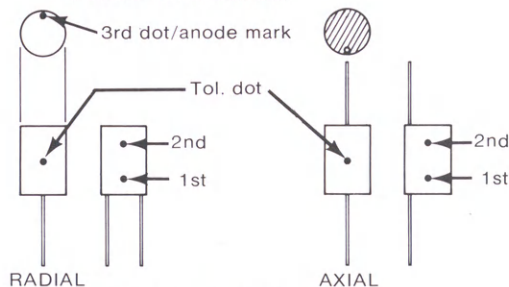
Impedance vs. Frequency

## PART NUMBERS AND ORDERING INFORMATION

P/N	μF Cap.	Max. WVDC	Max. % DF	Max. DCL
<b>Y Case Size</b> Std. Cap. Tol. +40% -20%				
MZY-020-102	.0010	20	6	0.5
MZY-020-152	.0015	20	6	0.5
MZY-020-222	.0022	20	6	0.5
MZY-020-332	.0033	20	6	0.5
MZY-020-472	.0047	20	6	0.5
MZY-020-682	.0068	20	6	0.5
MZY-020-103	.010	20	6	0.5
MZY-020-153	.015	20	6	0.5
MZY-020-223	.022	20	6	0.5
MZY-020-333	.033	20	6	0.5
MZY-020-473	.047	20	6	0.5
MZY-020-683	.068	20	6	0.5
MZY-020-104	.10	20	6	0.5
MZY-020-154	.15	20	6	0.5
MZY-020-224	.22	20	6	0.5
MZY-015-334	.33	15	6	0.5
MZY-010-474	.47	10	6	0.5
MZY-006-684	.68	6	6	0.5
MZY-004-105	1.0	4	8	0.5
MZY-003-155	1.5	3	10	0.5
MZY-002-225	2.2	2	10	0.5
<b>MZP Case Size</b> Std. Cap. Tol. +40% -20%				
MZP-050-102	.0010	50	6	0.5
MZP-050-152	.0015	50	6	0.5
MZP-050-222	.0022	50	6	0.5
<b>MZB Case Size</b> Std. Cap. Tol. ±20%				
MZB-035-334	.33	35	6	0.5
MZB-035-474	.47	35	6	0.5
MZB-020-684	.68	20	6	0.5
MZB-020-105	1.0	20	6	0.5
MZB-015-155	1.5	15	6	0.5
MZB-010-225	2.2	10	6	0.5
<b>MZG Case Size</b> Std. Cap. Tol. ±20%				
MZG-035-155	1.5	35	6	1.5
MZG-035-225	2.2	35	6	1.5
MZG-020-335	3.3	20	6	1.5
MZG-020-475	4.7	20	6	1.5
MZG-020-685	6.8	20	6	1.5
MZG-015-106	10	15	6	1.5
MZG-010-156	15	10	6	1.5
MZG-006-226	22	6	6	1.5
MZG-004-336	33	4	8	1.5
MZG-003-476	47	3	10	1.5

\*Add — "A" for Axial, "R" for Radial. \*\*Add Tolerance Symbol from Part Number Table.

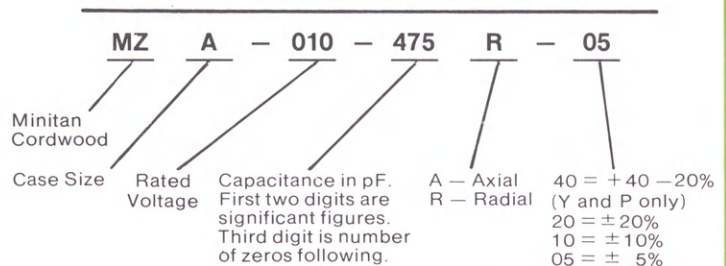
### PART MARKING



**EIA COLOR DOT CODING**

0 Black (omitted)	5 Green
1 Brown	6 Blue
2 Red	7 Violet
3 Orange	8 Gray
4 Yellow	9 White

### PART NUMBER EXPLANATION



**Marking** — Capacitance value is shown by means of standard EIA color code dots. The anode indicator dot also serves as the third color dot. Because the Polyester cases are black, black dots are omitted. ±10% tolerance is indicated by a silver dot, ±5% tolerance by a gold dot. No tolerance dot is used for ±20% or +40 -20%.



# Solid Tantalum Capacitors

CORNING

## SUBMINIATURE MINITAN® NONPOLAR MN SERIES

FOR FILTERING • COUPLING •  
BY-PASSING • TIMING

CORNING® solid tantalum capacitors are manufactured by Components Incorporated, a wholly owned subsidiary of Corning Glass Works.

These precision, microminiature nonpolar capacitors are intended specifically for high density packaging applications where occasional or continuous voltage reversals occur. No dc bias is required. Weldable/solderable leads and a wide range of shapes, case sizes, and lead configurations facilitate application to a broad range of miniaturized electronic circuitry.

### PERFORMANCE CHARACTERISTICS

**Capacitance** — Measured at +25°C and 120Hz on a polarized capacitance bridge with a maximum polarizing voltage of 2.2 vdc and a maximum ac signal of 1.0 volts rms.

**Tolerance** — Standard tolerance is  $\pm 20\%$  with  $\pm 10\%$  or  $\pm 5\%$  tolerance available in all case sizes. 10% decade values are offered in  $\pm 10\%$  or  $\pm 5\%$  tolerance.

**Dissipation Factor** — Measured simultaneously with capacitance as above. See Part Number Table for maximum +25°C, 120 Hz values.

**DC Leakage Current** — With rated WVDC applied through a 1000 ohm resistor for a maximum of 5 minutes, at 25°C. DCL values in  $\mu A$  will not exceed those shown in the part number section.

- at 85°C — 10 times the value
- at 125°C — 15 times the value at ( % rated voltage).

**Operating Voltage** — Capacitors will operate at +85°C and to +125°C with linear derating to  $\frac{1}{2}$  rated voltage. Dc biasing is not necessary. Peak ac voltage plus dc voltage should not exceed rated voltage.

**Surge Voltage** — At +85°C and at 60-second intervals, capacitors withstand 1000 30-second applications of 130% rated WVDC.

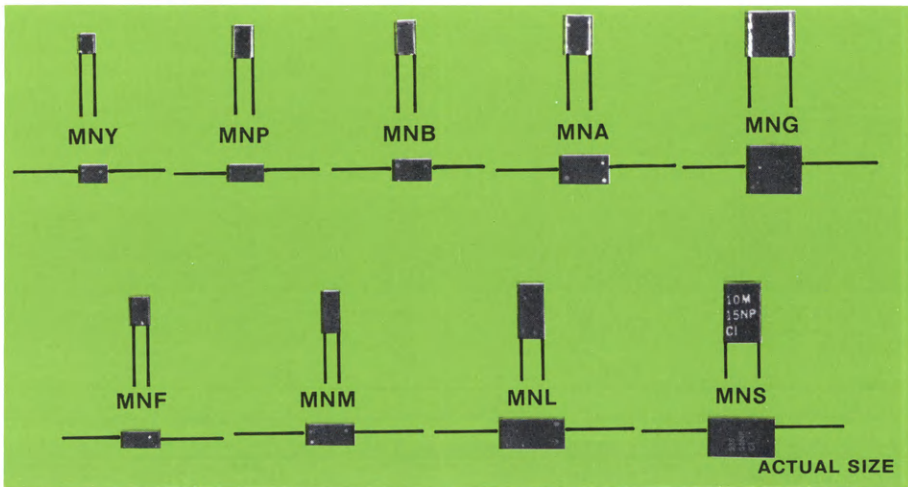
**Temperature** — No derating is required between -55°C and +85°C. Between +85°C and +125°C, derate linearly to  $\frac{1}{2}$  WVDC.

**Moisture Resistance** — Following Method 106, MIL-STD-202 testing, capacitors will meet initial dc leakage requirements. Capacitance will be within  $\pm 10\%$  of initial values.

**Life Test** — After 2000 hours at +85°C with rated WVDC applied, capacitors will meet initial dc leakage and DF requirements. Capacitance will not change more than  $\pm 10\%$  from original values.

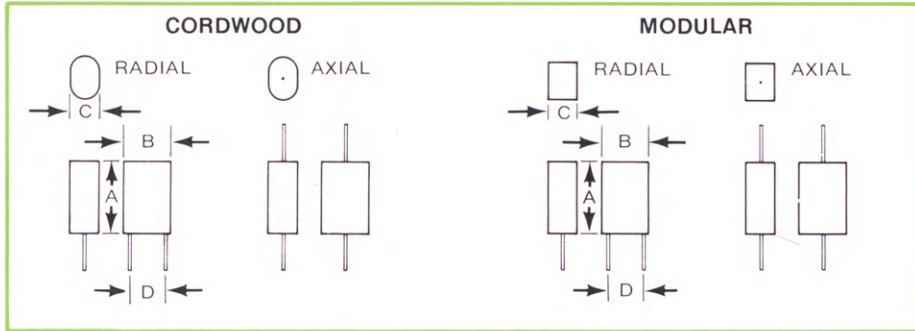
### MECHANICAL

**Construction** — Tantalum pellets are encased in polyester sleeves and sealed with



a special moisture resistant epoxy resin. This rugged, fully insulated package withstands a one minute application of a 100 volt potential applied between the leads shorted together and an encircling metal foil envelope.

**Leads** — Leads are solder coated pure nickel wire suitable for soldering or welding. Tested in accordance with MIL-C-55365, .010 diameter leads withstand a 1 lb. pull and .016 diameter leads a 3 lb. pull. All lead diameters withstand 5 rotations twist.



Dimensions — Inches (Millimeters)					
Case Size	A Max. (Axial)	A Max. (Radial)	B Max.	C Max.	D
MNY	.175 (4.45)	.135 (3.43)	.120 (3.05)	.070 (1.78)	.100 (2.54) $\pm .020 (\pm .51)$
MNP	.210 (5.33)	.160 (4.06)	.120 (3.05)	.070 (1.78)	.100 (2.54) $\pm .020 (\pm .51)$
MNB	.240 (6.10)	.200 (5.08)	.140 (3.56)	.080 (2.03)	.100 (2.54) $\pm .020 (\pm .51)$
MNA	.275 (6.99)	.235 (5.97)	.190 (4.83)	.105 (2.67)	.125 (3.18) $\pm .020 (\pm .51)$
MNG	.310 (7.87)	.270 (6.86)	.290 (7.37)	.155 (3.94)	.200 (5.08) $\pm .025 (\pm .64)$
MNF	.220 (5.59)	.180 (4.57)	.125 (3.18)	.125 (3.18)	.100 (2.54) $\pm .020 (\pm .51)$
MNM	.280 (7.11)	.240 (6.10)	.140 (3.56)	.180 (4.57)	.100 (2.54) $\pm .020 (\pm .51)$
MNL	.370 (9.40)	.315 (8.00)	.180 (4.57)	.220 (5.59)	.150 (3.81) $\pm .025 (\pm .64)$
MNS	.390 (9.91)	.335 (8.51)	.230 (5.84)	.230 (5.84)	.200 (5.08) $\pm .025 (\pm .64)$

**Leads:** NG, NL and NS leads are 26 AWG, .016  $\pm$  .002 (.41  $\pm$  .051) diameter  
All others are 30 AWG, .010  $\pm$  .002 (.25  $\pm$  .051) diameter  
All leads are 1.625  $\pm$  .125 (41.3  $\pm$  3.18) long  
Cap and WVDC are printed on NS case



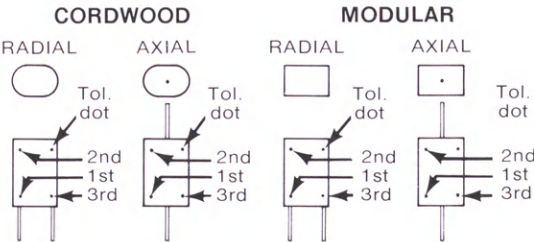
PART NUMBERS AND ORDERING INFORMATION

P/N	μF Cap.	Max. WVDC	Max. % DF	Max. DCL	P/N	μF Cap.	Max. WVDC	Max. % DF	Max. DCL	P/N	μF Cap.	Max. WVDC	Max. % DF	Max. DCL
<b>MNY Case Size</b> <b>Std. Cap. Tol. ±20%</b>					<b>MNB Case Size</b> <b>Std. Cap. Tol. ±20%</b>					<b>MNF Case Size</b> <b>Std. Cap. Tol. ±20%</b>				
MNY-020-102 ±- **	.0010	20	6	0.5	MNB-035-154 ±- **	.15	35	6	0.5	MNF-020-474 ±- **	.47	20	6	0.5
MNY-020-152 - - - -	.0015	20	6	0.5	MNB-035-224 - - - -	.22	35	6	0.5	MNF-015-684 - - - -	.68	15	6	0.5
MNY-020-222 - - - -	.0022	20	6	0.5	MNB-020-334 - - - -	.33	20	6	0.5	MNF-010-105 - - - -	1.0	10	6	0.5
MNY-020-332 - - - -	.0033	20	6	0.5	MNB-020-474 - - - -	.47	20	6	0.5	MNF-006-155 - - - -	1.5	6	6	0.5
MNY-020-472 - - - -	.0047	20	6	0.5	MNB-015-684 - - - -	.68	15	6	0.5	MNF-004-225 - - - -	2.2	4	8	0.5
MNY-020-682 - - - -	.0068	20	6	0.5	MNB-010-105 - - - -	1.0	10	6	0.5	MNF-003-335 - - - -	3.3	3	10	0.5
MNY-020-103 - - - -	.010	20	6	0.5	MNB-006-155 - - - -	1.5	6	6	0.5	MNF-002-475 - - - -	4.7	2	10	0.5
MNY-020-153 - - - -	.015	20	6	0.5	MNB-004-225 - - - -	2.2	4	8	0.5					
MNY-020-223 - - - -	.022	20	6	0.5	MNB-003-335 - - - -	3.3	3	10	0.5	<b>MNM Case Size</b> <b>Std. Cap. Tol. ±20%</b>				
MNY-020-333 - - - -	.033	20	6	0.5	MNB-002-475 - - - -	4.7	2	10	0.5	MNM-035-334 ±- **	.33	35	6	1.0
MNY-020-473 - - - -	.047	20	6	0.5	<b>MNA Case Size</b> <b>Std. Cap. Tol. ±20%</b>					MNM-035-474 - - - -	.47	35	6	1.0
MNY-020-683 - - - -	.068	20	6	0.5	MNA-035-334 ±- **	.33	35	6	1.0	MNM-035-684 - - - -	.68	35	6	1.0
MNY-020-104 - - - -	.10	20	6	0.5	MNA-035-474 - - - -	.47	35	6	1.0	MNM-025-105 - - - -	1.0	25	6	1.0
MNY-015-154 - - - -	.15	15	6	0.5	MNA-020-684 - - - -	.68	20	6	1.0	MNM-020-155 - - - -	1.5	20	6	1.0
MNY-010-224 - - - -	.22	10	6	0.5	MNA-020-105 - - - -	1.0	20	6	1.0	MNM-020-225 - - - -	2.2	20	6	1.0
MNY-006-334 - - - -	.33	6	6	0.5	MNA-015-155 - - - -	1.5	15	6	1.0	MNM-010-335 - - - -	3.3	10	6	1.0
MNY-004-474 - - - -	.47	4	8	0.5	MNA-010-225 - - - -	2.2	10	6	1.0	MNM-006-475 - - - -	4.7	6	6	1.0
MNY-003-684 - - - -	.68	3	10	0.5	MNA-006-335 - - - -	3.3	6	6	1.0	MNM-004-685 - - - -	6.8	4	8	1.0
MNY-002-105 - - - -	1.0	2	10	0.5	MNA-004-475 - - - -	4.7	4	8	1.0	MNM-003-106 - - - -	10.	3	10	1.0
<b>MNP Case Size</b> <b>Std. Cap. Tol. ±20%</b>					MNA-003-685 - - - -	6.8	3	10	1.0	<b>MNL Case Size</b> <b>Std. Cap. Tol. ±20%</b>				
MNP-050-102 ±- **	.0010	50	6	0.5	MNA-002-106 - - - -	10.	2	10	1.0	MNL-035-105 ±- **	1.0	35	6	2.0
MNP-050-152 - - - -	.0015	50	6	0.5	<b>MNG Case Size</b> <b>Std. Cap. Tol. ±20%</b>					MNL-035-155 - - - -	1.5	35	6	2.0
MNP-050-222 - - - -	.0022	50	6	0.5	MNG-035-684 ±- **	.68	35	6	1.5	MNL-035-225 - - - -	2.2	35	6	2.0
MNP-050-332 - - - -	.0033	50	6	0.5	MNG-035-105 - - - -	1.0	35	6	1.5	MNL-025-335 - - - -	3.3	25	6	2.0
MNP-050-472 - - - -	.0047	50	6	0.5	MNG-020-155 - - - -	1.5	20	6	1.5	MNL-020-475 - - - -	4.7	20	6	2.0
MNP-035-682 - - - -	.0068	35	6	0.5	MNG-020-225 - - - -	2.2	20	6	1.5	MNL-015-685 - - - -	6.8	15	6	2.0
MNP-035-103 - - - -	.010	35	6	0.5	MNG-020-335 - - - -	3.3	20	6	1.5	MNL-010-106 - - - -	10.	10	6	2.0
MNP-035-153 - - - -	.015	35	6	0.5	MNG-015-475 - - - -	4.7	15	6	1.5	MNL-006-156 - - - -	15.	6	6	2.0
MNP-035-223 - - - -	.022	35	6	0.5	MNG-010-685 - - - -	6.8	10	6	1.5	MNL-004-226 - - - -	22.	4	8	2.0
MNP-035-333 - - - -	.033	35	6	0.5	MNG-006-106 - - - -	10.	6	6	1.5	<b>MNS Case Size</b> <b>Std. Cap. Tol. ±20%</b>				
MNP-035-473 - - - -	.047	35	6	0.5	MNG-004-156 - - - -	15.	4	8	1.5	MNS-035-335 ±- **	3.3	35	6	3.0
MNP-035-683 - - - -	.068	35	6	0.5	MNG-003-226 - - - -	22.	3	10	1.5	MNS-025-475 - - - -	4.7	25	6	3.0
MNP-035-104 - - - -	.10	35	6	0.5	<b>MNF Case Size</b> <b>Std. Cap. Tol. ±20%</b>					MNS-020-685 - - - -	6.8	20	6	3.0
MNP-020-154 - - - -	.15	20	6	0.5	MNF-035-104 ±- **	.10	35	6	0.5	MNS-015-106 - - - -	10.	15	6	3.0
MNP-020-224 - - - -	.22	20	6	0.5	MNF-035-154 - - - -	.15	35	6	0.5	MNS-010-156 - - - -	15.	10	6	3.0
MNP-015-334 - - - -	.33	15	6	0.5	MNF-035-224 - - - -	.22	35	6	0.5	MNS-006-226 - - - -	22.	6	6	3.0
MNP-010-474 - - - -	.47	10	6	0.5	MNF-025-334 - - - -	.33	25	6	0.5	MNS-004-336 - - - -	33.	4	8	3.0
MNP-006-684 - - - -	.68	6	6	0.5										
MNP-004-105 - - - -	1.0	4	8	0.5										
MNP-003-155 - - - -	1.5	3	10	0.5										
MNP-002-225 - - - -	2.2	2	10	0.5										

\*Add "A" — for Axial leads, "R" — for Radial leads      \*\*Add tolerance symbol from Part Number Explanation.

PART MARKING

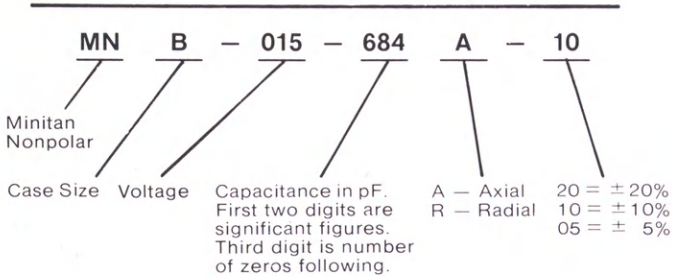
MNS case size is type marked all other case sizes are color coded.



EIA COLOR DOT CODING

- |                   |          |
|-------------------|----------|
| 0 Black (Omitted) | 5 Green  |
| 1 Brown           | 6 Blue   |
| 2 Red             | 7 Violet |
| 3 Orange          | 8 Gray   |
| 4 Yellow          | 9 White  |

PART NUMBER EXPLANATION



**MARKING** — Capacitance value is shown by means of standard EIA color code dots. Because the polyester cases are black, black dots are omitted. ±10% tolerance is indicated by a silver dot, ±5% tolerance by a gold dot. No tolerance dot is used for ±20%.

METAL FILM RESISTORS

PACKAGING



# Solid Tantalum Capacitors

CORNING

## SUBMINIATURE MINIDIP™ MD SERIES

For Filtering • Coupling  
• By-Passing • Timing

CORNING® solid tantalum capacitors are manufactured by Components Incorporated, a wholly owned subsidiary of Corning Glass Works.

These subminiature, polar tantalum capacitors are suitable for general filtering, coupling, by-passing and non-critical RC timing applications to +85°C without voltage derating. Intended specifically for commercial and industrial applications, Minidip Series capacitors feature subminiature size and superior performance at a reasonable cost.

### PERFORMANCE CHARACTERISTICS

**Capacitance** — Measured at +25°C and 120 Hz on a polarized capacitance bridge with a maximum polarizing voltage of 2.2 VDC and a maximum AC signal of 1.0 volts RMS.

**Tolerance** — Standard tolerance is ±20%. ±10% tolerance is available.

**Dissipation Factor** — Measured simultaneously with capacitance as above.

**Operating Voltage** — Capacitors will operate reliably up to rated WVDC at +85°C without derating. AC ripple voltage should be limited so that the forward DC voltage plus peak AC voltage does not exceed rated WVDC.

**Temperature Range** — -55°C to +85°C without voltage derating.

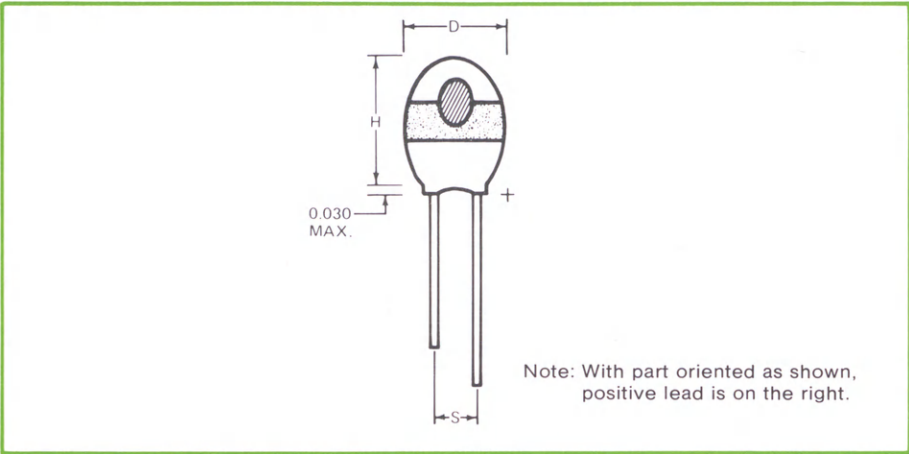
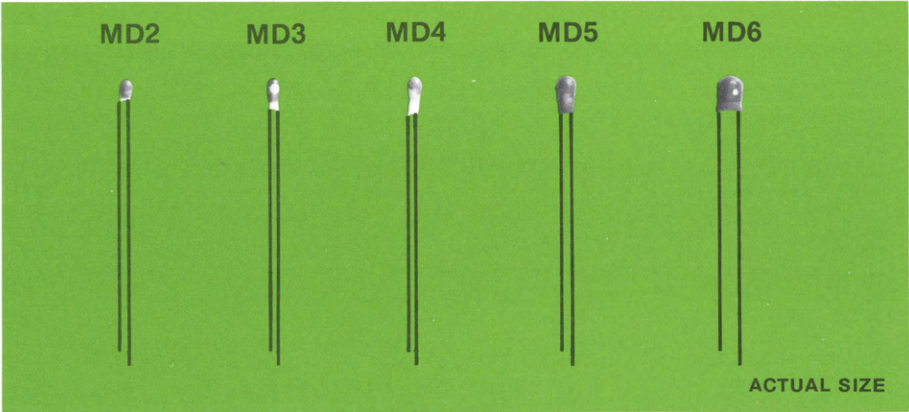
**Surge Voltage** — At +85°C and at 60-second intervals, capacitors withstand 1000 30-second applications of 130% rated WVDC.

**Life Test** — After 2000 hours at +85°C with rated WVDC applied, capacitors will not exceed 150% of the initial DC leakage and D.F. limits. Capacitance will not change more than ±10% from the initial value.

### MECHANICAL

**Construction** — Minidip Series capacitors feature subminiature tantalum anodes, sealed in high stability, moisture-resistant epoxy.

**Leads** — Leads are solder coated, high purity nickel wire suitable for either soldering or welding. Tested in accordance with MIL-C-55365, termination will withstand a one pound pull.



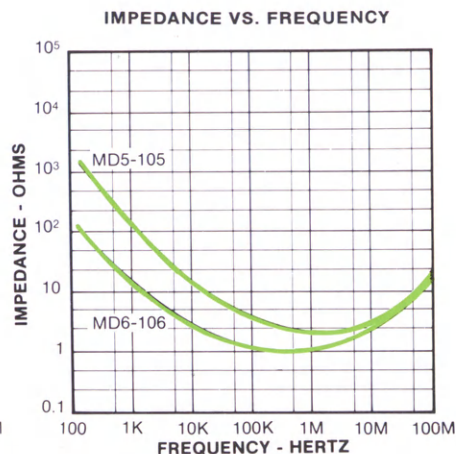
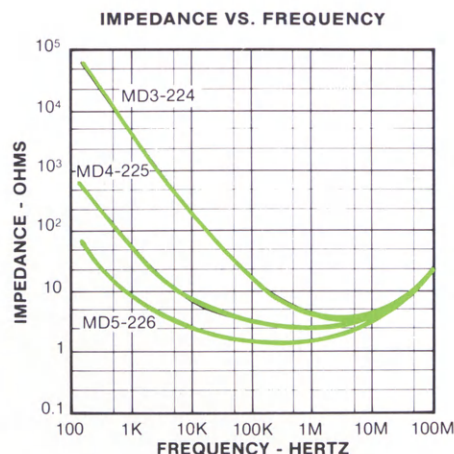
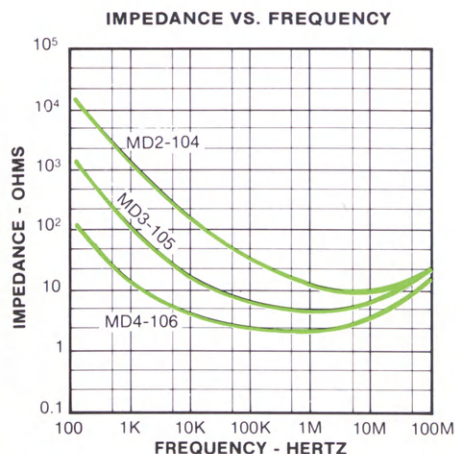
### Dimensions — Inches (Millimeters)

Case Size	H Max.	D Max.	S	Lead Length ± 0.125 (± 3.18)		Lead Diameter ± 0.002 (± 0.051)
				Anode	Cathode	
MD2	0.175	0.095	0.050 ±0.015 (1.27)	1.625	1.375	30 AWG 0.010
	(4.44)	(2.41)	(±0.38)	(41.3)	(34.9)	(0.250)
MD3	0.210	0.110	0.050 ±0.015 (1.27)	1.625	1.375	30 AWG 0.010
	(5.33)	(2.79)	(±0.38)	(41.3)	(34.9)	(0.250)
MD4	0.260	0.125	0.050 ±.015 (1.27)	1.625	1.375	30 AWG 0.010
	(6.60)	(3.18)	(±0.38)	(41.3)	(34.9)	(0.250)
MD5	0.260	0.150	0.100 ±0.025 (2.54)	1.625	1.375	30 AWG 0.010
	(6.60)	(3.81)	(±0.64)	(41.3)	(34.9)	(0.250)
MD6	0.280	0.175	.125 ±0.025 (3.18)	1.625	1.375	26 AWG 0.016
	(7.11)	(4.44)	(±0.64)	(41.3)	(34.9)	(0.406)



# Solid Tantalum Capacitors

CORNING

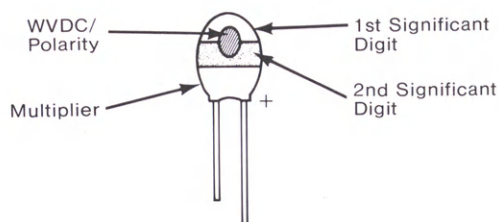


## PART NUMBERS AND ORDERING INFORMATION

Value (Mfd)	Part Number	Case Size	Max D.F. (%)	Max DCL (μa)
<b>2 Volts</b>				
2.2	MD2-002-225-20	MD2	10	1.0
4.7	MD3-002-475-20	MD3	10	1.0
10.0	MD4-002-106-20	MD4	10	1.0
22.0	MD5-002-226-20	MD5	10	1.0
68.0	MD6-002-686-20	MD6	15	1.5
<b>3 Volts</b>				
1.5	MD2-003-155-20	MD2	10	1.0
3.3	MD3-003-335-20	MD3	10	1.0
6.8	MD4-003-685-20	MD4	10	1.0
15.0	MD5-003-156-20	MD5	10	1.0
47.0	MD6-003-476-20	MD6	10	1.5
<b>4 Volts</b>				
1.0	MD2-004-105-20	MD2	8	1.0
2.2	MD3-004-225-20	MD3	8	1.0
4.7	MD4-004-475-20	MD4	8	1.0
10.0	MD5-004-106-20	MD5	10	1.0
33.0	MD6-004-336-20	MD6	10	1.5
<b>6 Volts</b>				
.68	MD2-006-684-20	MD2	8	1.0
1.5	MD3-006-155-20	MD3	8	1.0
3.3	MD4-006-335-20	MD4	8	1.0
6.8	MD5-006-685-20	MD5	8	1.0
22.0	MD6-006-226-20	MD6	8	1.5
<b>10 Volts</b>				
.47	MD2-010-474-20	MD2	8	1.0
1.0	MD3-010-105-20	MD3	8	1.0
2.2	MD4-010-225-20	MD4	8	1.0
4.7	MD5-010-475-20	MD5	8	1.0
15.0	MD6-010-156-20	MD6	8	1.5
<b>15 Volts</b>				
.33	MD2-015-334-20	MD2	8	1.0
.68	MD3-015-684-20	MD3	8	1.0
1.5	MD4-015-155-20	MD4	8	1.0
3.3	MD5-015-335-20	MD5	8	1.0
10.0	MD6-015-106-20	MD6	8	1.5
<b>20 Volts</b>				
.15	MD2-020-154-20	MD2	8	1.0
.22	MD2-020-224-20	MD2	8	1.0
.33	MD3-020-334-20	MD3	8	1.0
.47	MD3-020-474-20	MD3	8	1.0
.68	MD4-020-684-20	MD4	8	1.0
1.0	MD4-020-105-20	MD4	8	1.0
1.5	MD5-020-155-20	MD5	8	1.0
2.2	MD5-020-225-20	MD5	8	1.0
6.8	MD6-020-685-20	MD6	8	1.5
<b>35 Volts</b>				
.10	MD2-035-104-20	MD2	8	1.0
.15	MD3-035-154-20	MD3	8	1.0
.22	MD3-035-224-20	MD3	8	1.0
.33	MD4-035-334-20	MD4	8	1.0
.47	MD4-035-474-20	MD4	8	1.0
.68	MD5-035-684-20	MD5	8	1.0
1.0	MD5-035-105-20	MD5	8	1.0
1.5	MD5-035-155-20	MD5	8	1.0
2.2	MD6-035-225-20	MD6	8	1.0
3.3	MD6-035-335-20	MD6	8	1.0
4.7	MD6-035-475-20	MD6	8	1.5

**MARKING** — Capacitance value in pF is shown by means of standard EIA color code rings. Polarity and rated voltage is indicated by a colored dot.

### PART MARKING



Note: With part oriented as shown, positive lead is on the right.

Capacitance Code			WVDC/Polarity Dot	
Color	Significant Figures	Multiplier	Color	WVDC
Black	0		Brown	2v
Brown	1		White	3v
Red	2		Purple	4v
Orange	3	1,000	Yellow	6v
Yellow	4	10,000	Black	10v
Green	5	100,000	Green	15v
Blue	6	1,000,000	Blue	20v
Violet	7		Pink	35v
Gray	8			
White	9			

### PART NUMBER EXPLANATION

<b>MD</b>	<b>2</b>	<b>035</b>	<b>104</b>	<b>20</b>
Minidip Series Designator	Case Size	Rated Voltage	Capacitance in pF. First two digits are significant figures. Third digit is the number of zeros following.	Tolerance ±20% ±10%

METAL FILM  
RESISTORS

PACKAGING



# Solid Tantalum Capacitors



## SUBMINIATURE TANTALUM CHIPS MC SERIES

### FOR FILTERING • COUPLING • BY-PASSING • TIMING

CORNING® solid tantalum capacitors are manufactured by Components Incorporated, a wholly owned subsidiary of Corning Glass Works. Packaging bears CI or CORNING Components Incorporated markings.

Microminiature MC chip capacitors are designed specifically for hybrid, thick film, and microcircuit applications where mounting space is critical and where conventionally packaged capacitors may not be used. The MC series capacitors are suitable for general coupling, filtering, by-passing, and non-critical timing applications over the temperature range of  $-55^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$  and over the capacitance range .1 to  $100\mu\text{F}$ . Extended capacitance values are available on special order.

### PERFORMANCE CHARACTERISTICS

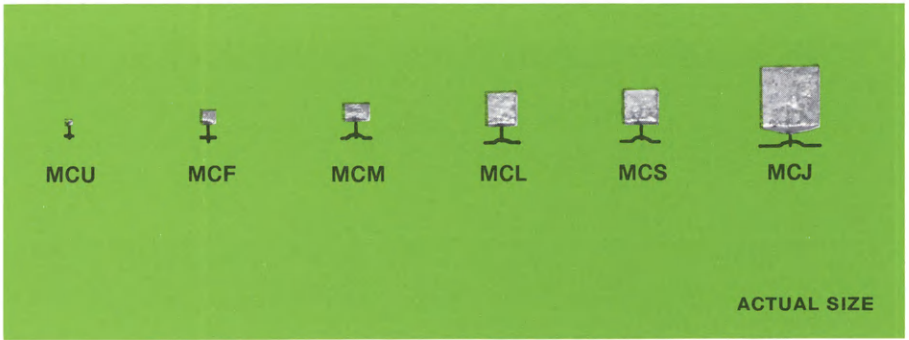
**Capacitance** — Measured on a polarized capacitance bridge with a maximum polarizing voltage of 2.2 vdc and a maximum ac signal 1.0 volts rms. See Part Number Table for available ratings.

**Tolerance** — Standard tolerance is  $\pm 20\%$ , except for the MCU case size ( $+40, -20\%$ ).  $\pm 10\%$  and  $\pm 5\%$  tolerances are available in all case sizes. 10% capacitance decade values are offered in  $\pm 10\%$  or  $\pm 5\%$  tolerances.

**DC Leakage Current** — With rated dc voltage applied through a 1000 ohm resistor in series with the capacitor, DCL will not exceed the values shown in Part Number Table. At  $+85^{\circ}\text{C}$ , DCL values will not exceed 10 times Part Number Table values. At  $+125^{\circ}\text{C}$  with  $\frac{2}{3}$  rated WVDC applied, DCL values will not exceed 15 times Part Number Table values.

**Dissipation Factor** — Measured simultaneously with capacitance as above. See Part Number Table for maximum  $+25^{\circ}\text{C}$  values.

**Operating Voltage** — Capacitors will operate reliably up to rated WVDC at  $+85^{\circ}\text{C}$  and  $+125^{\circ}\text{C}$  with linear derating to  $\frac{2}{3}$  WVDC. AC ripple voltage should be limited so that the forward dc voltage plus peak ac voltage does not exceed rated WVDC.



**Temperature** — No derating is required between  $-55^{\circ}\text{C}$  and  $+85^{\circ}\text{C}$ . Between  $+85^{\circ}\text{C}$  and  $+125^{\circ}\text{C}$ , derate linearly to  $\frac{2}{3}$  WVDC.

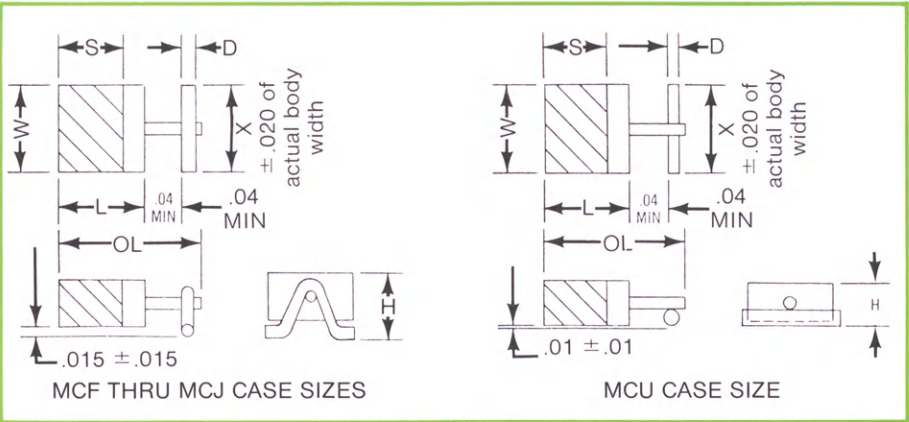
**Surge Voltage** — At  $+85^{\circ}\text{C}$  and at 60-second intervals, capacitors withstand 1000 30-second applications of 130% rated WVDC.

**Life Test** — After 2000 hours at  $+85^{\circ}\text{C}$  with rated WVDC applied, capacitors will meet initial dc leakage and DF requirements. Capacitance will not change more than  $\pm 10\%$  from initial values.

### MECHANICAL

**Construction** — Tantalum pellets are coated with 60/38/2 (2% silver) eutectic solder suitable for reflow solder mounting. The negative terminal is the capacitor body itself. The positive terminal is a solder coated nickel wire.

**Lead Attachment** — Positive leads may be attached by conventional welding or soldering techniques. Negative terminal attachment is accomplished by reflow soldering. Soldering technique, time, and temperature are critical to reliable performance and circuit yields.



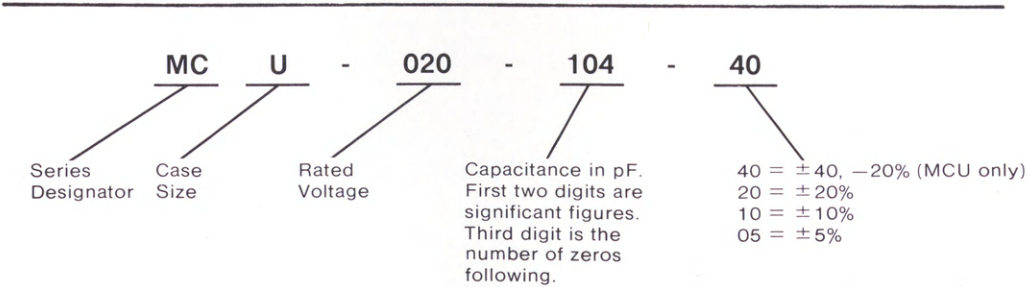
### Dimensions — Inches (Millimeters)

Case Size	H Max.	W Max.	L Max.	OL Max.	D $\pm .002$ ( $\pm .051$ )	S Min.
MCU	.060 (1.52)	.056 (1.65)	.085 (2.16)	.155 ( 3.94)	.016 (.41)	75%
MCF	.085 (2.16)	.110 (2.79)	.110 (2.79)	.180 ( 4.57)	.020 (.51)	75%
MCM	.100 (2.54)	.170 (4.32)	.175 (4.44)	.245 ( 6.22)	.020 (.51)	75%
MCL	.120 (3.05)	.205 (5.21)	.230 (5.84)	.300 ( 7.62)	.020 (.51)	75%
MCS	.145 (3.68)	.210 (5.33)	.240 (6.10)	.310 ( 7.87)	.020 (.51)	75%
MCJ	.170 (4.32)	.355 (9.02)	.390 (9.91)	.460 (11.68)	.020 (.51)	75%

PART NUMBERS AND ORDERING INFORMATION

Part Number	Cap. in $\mu$ F @25°C 120 Hz	WVDC @ 85°C	Max. DF % @25°C 120 Hz	Max. DCL In $\mu$ A @ 25°C	Part Number	Cap. in $\mu$ F @25°C 120 Hz	WVDC @ 85°C	Max. DF % @25°C 120 Hz	Max. DCL In $\mu$ A @ 25°C
<b>MCU Case Size</b> Std. Cap. Tol. +40% -20%					<b>MCL Case Size</b> Std. Cap. Tol. $\pm$ 20%				
MCU-020-104-*	.10	20	6	0.5	MCL-035-225-*	2.2	35	6	2.0
MCU-020-154-__	.15	20	6	0.5	MCL-035-335-__	3.3	35	6	2.0
MCU-020-224-__	.22	20	6	0.5	MCL-035-475-__	4.7	35	6	2.0
MCU-015-334-__	.33	15	6	0.5	MCL-025-685-__	6.8	25	6	2.0
MCU-010-474-__	.47	10	6	0.5	MCL-020-106-__	10.0	20	6	2.0
MCU-006-684-__	.68	6	6	0.5	MCL-015-156-__	15.0	15	6	2.0
MCU-004-105-__	1.0	4	8	0.5	MCL-010-226-__	22.0	10	6	2.0
MCU-003-155-__	1.5	3	10	0.5	MCL-006-336-__	33.0	6	6	2.0
<b>MCF Case Size</b> Std. Cap. Tol. $\pm$ 20%					MCL-004-476-__	47.0	4	8	2.0
MCF-035-104-*	.10	35	6	0.5	<b>MCS Case Size</b> Std. Cap. Tol. $\pm$ 20%				
MCF-035-154-__	.15	35	6	0.5	MCS-035-685-*	6.8	35	6	3.0
MCF-035-224-__	.22	35	6	0.5	MCS-025-106-__	10.0	25	6	3.0
MCF-035-334-__	.33	35	6	0.5	MCS-020-156-__	15.0	20	6	3.0
MCF-035-474-__	.47	35	6	0.5	MCS-015-226-__	22.0	15	6	3.0
MCF-025-684-__	.68	25	6	0.5	MCS-010-336-__	33.0	10	6	3.0
MCF-020-105-__	1.0	20	6	0.5	MCS-006-476-__	47.0	6	6	3.0
MCF-015-155-__	1.5	15	6	0.5	MCS-004-686-__	68.0	4	8	3.0
MCF-010-225-__	2.2	10	6	0.5	<b>MCJ Case Size</b> Std. Cap. Tol. $\pm$ 20%				
MCF-006-335-__	3.3	6	6	0.5	MCJ-035-106-*	10.0	35	8	9.0
MCF-004-475-__	4.7	4	8	0.5	MCJ-035-156-__	15.0	35	8	9.0
MCF-003-685-__	6.8	3	10	0.5	MCJ-035-226-__	22.0	35	8	9.0
MCF-002-106-__	10.0	2	10	0.5	MCJ-025-336-__	33.0	25	8	9.0
<b>MCM Case Size</b> Std. Cap. Tol. $\pm$ 20%					MCJ-020-476-__	47.0	20	8	9.0
MCM-035-684-*	.68	35	6	1.0	MCJ-015-686-__	68.0	15	8	9.0
MCM-035-105-__	1.0	35	6	1.0	MCJ-010-107-__	100.00	10	8	9.0
MCM-035-155-__	1.5	35	6	1.0	*Tolerance is indicated by adding suffix "-40" for +40%, -20% tolerance, "-20" for $\pm$ 20%, "-10" for $\pm$ 10%, and "-05" for $\pm$ 5% tolerance, i.e., MCU-020-104-40, MCS-035-685-10, etc.				
MCM-025-225-__	2.2	25	6	1.0					
MCM-020-335-__	3.3	20	6	1.0					
MCM-020-475-__	4.7	20	6	1.0					
MCM-010-685-__	6.8	10	6	1.0					
MCM-006-106-__	10.0	6	6	1.0					
MCM-004-156-__	15.0	4	8	1.0					
MCM-003-226-__	22.0	3	10	1.0					

PART NUMBER EXPLANATION





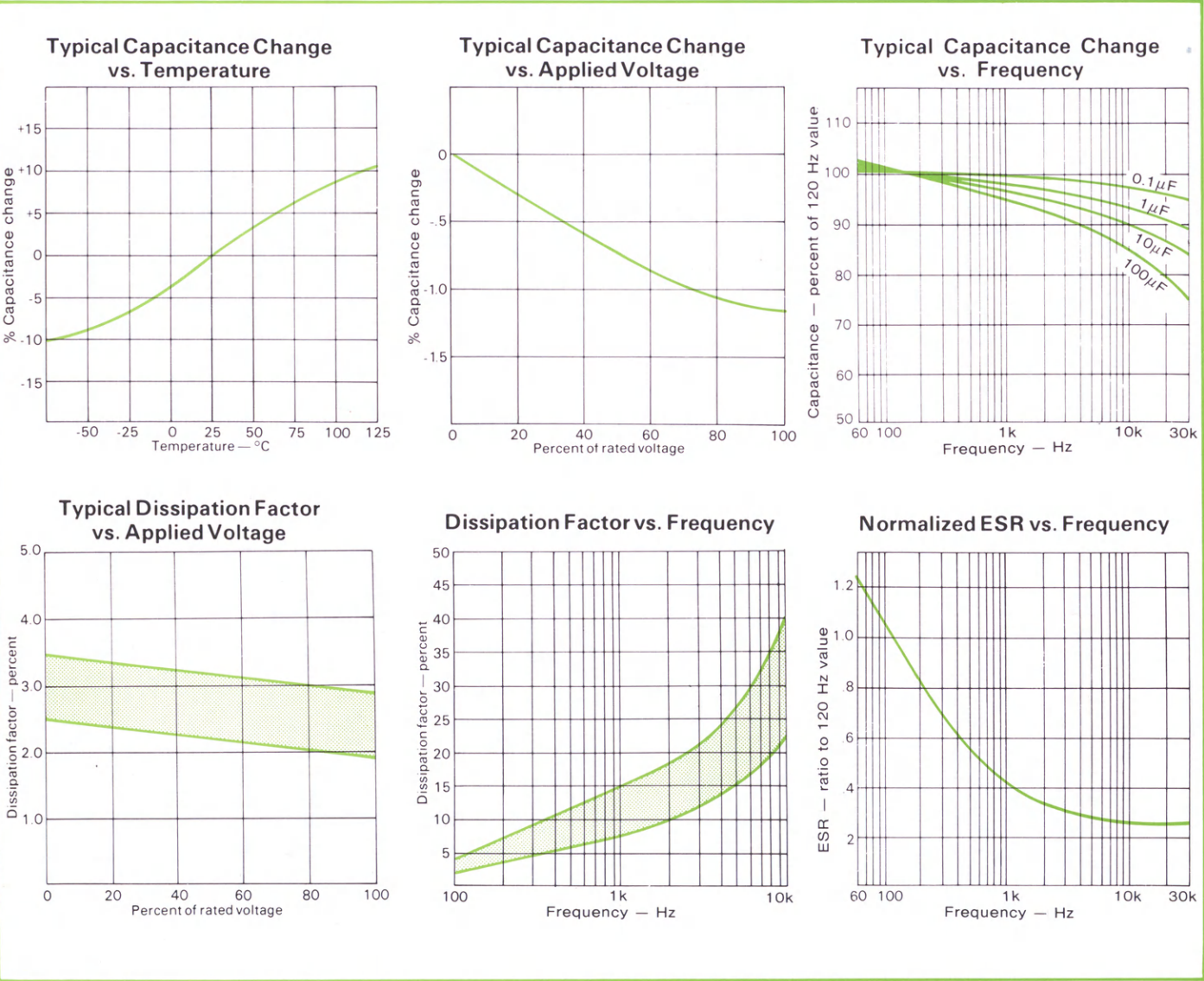
PERFORMANCE CURVES FOR SOLID TANTALUM CAPACITORS

**Capacitance vs Temperature, Voltage, and Frequency**—Nominal capacitance as specified for each product is measured at 25°C with a maximum dc bias of 2.2 volts and a maximum ac signal of 1 vrms. Since these are seldom the actual operating conditions, the graphs show typical capacitance change vs temperature, voltage, and frequency. These characteristics are

somewhat variable with capacitance value, case size, and working voltage, but the referenced curves give a good indication of direction and magnitude of typical capacitance change.

**Dissipation Factor and ESR vs Frequency and Voltage**—Product limits for dissipation factor are specified under the same measurement con-

ditions as used for capacitance. Although ESR (equivalent series resistance) is not specified, it can be calculated from capacitance and DF. Dissipation factor at voltages and frequencies other than those specified can be determined from the graphs. ESR vs frequency, normalized with respect to the 120 hz value, is also shown.



## METAL FILM RESISTORS

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## For the Following:

- Placement of Orders
- Price Quotations
- Delivery
- Specifications or drawing reviews
- Samples
- Location of a franchised distributor
- Technical Information  
    Product Capabilities  
    Applications Assistance

## Contact:

**Customer Service**

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Bradford, PA 16701  
(814) 362-5571  
TLX — 914496  
TWX — 510-695-5638

**Customer Engineering**

Corning Glass Works  
550 High Street  
Bradford, PA 16701  
(814) 362-5571  
TLX — 914496  
TWX — 510-695-5638



## Introduction

The exacting performance requirements of today's electronic systems demand the use of only the most stable and reliable components. At Corning, our direction has been to reduce the burden placed on the circuit designer by developing metal film resistors that produce precision performance and high levels of reliability for the life of any circuit.

For example: Long term reliability in precision resistors was a problem until Corning introduced the NE, NC and NA style resistors. How much precision to buy was often a question until we developed the C3, C4, and C5 style multi-purpose resistors, opening

the way to performance with economy. Shorts and flaming failures worried many users until Corning developed the exclusive FP resistors. Entirely flameproof, these resistors will not flame or short, even under the most severe overloads.

By anticipating the designer's resistor problems, we have developed the precision, reliability, quality, and usefulness of CORNING® metal film resistors.

### Established Reliability

CORNING metal film resistors have demonstrated a failure rate of 0.00013%/1000 hours, based on approximately one billion unit test hours.

The quality Corning builds into its resistors has been demonstrated by field performance in high reliability programs such as: Minuteman, Safe-guard, Mercury, Gemini, Apollo, Mariner, and Poseidon, as well as our involvement in virtually every other military program requiring resistors.

MIL-R-22684 and MIL-R-10509 are now inactive for new design, and are superseded by Established Reliability specifications MIL-R-39017 and MIL-R-55182, respectively. Corning is qualified to supply to these specifications.

## MILITARY PART NUMBER EXPLANATION

### MIL-R-22684 (RL07S103J)

RL	07	S	103	J
Fixed Film Resistor MIL-R-22684	Size and Power Rating at 70°C 07 = ¼ watt 20 = ½ watt 32 = 1 watt 42 = 2 watt	Solderable Lead	Resistance in ohms First two digits represent significant figures and the last digit specifies the number of zeros to follow 103 = 10,000 ohms	Resistance Tolerance G = ±2% J = ±5%

### MIL-R-39017 (RLR20C1003GR)

RLR	20	C	1003	G	R
Established Reliability Fixed Film Resistor (±100PPM/°C)	Size power rating at 70°C 05 = ⅛ watt 07 = ¼ watt 20 = ½ watt 32 = 1 watt	Lead Material Type C Solderable/weldable	Coded Resistance Value in ohms. First 3 digits are significant figures, fourth digit is the multiplier. ±5% parts use a three digit code.	Tolerance J = ±5% G = ±2% F = ±1%	Failure Rate 1000 Hours (60% confidence) M = 1.0% P = 0.1% R = .01%

### MIL-R-10509 (RN60D1003F)

RN	60	D	1003	F
Fixed film (high stability) resistor MIL-R-10509	Size 50, 55, 60, 65, 70.	Temperature characteristic in PPM/°C B = ±500 C = ±50 D = +200, -500 E = ±25	Resistance in ohms First three digits are significant figures and the last digit specifies the number of zeros to follow (1003 = 100,000 ohms) R = decimal point (i.e. 49R9 = 49.9 ohms)	Resistance Tolerance B* = ±0.10% C* = ±0.25% D = ±0.50% F = ±1.00% *Available only in temperature characteristic "C" and "E"

### MIL-R-55182 (RNC55H49R9FS)

RNC	55	H	49R9	F	S
Established Reliability Precision Molded Metal Film Resistor. RNC with solderable/weldable leads. RNR with solderable leads.	Case Size 55 60	Characteristic J = non-hermetic ±25PPM/°C H = non-hermetic ±50PPM/°C K = non-hermetic ±100PPM/°C	Resistance in ohms First three digits are significant figures and the last digit specifies the number of zeros to follow (49R9 = 49.9 ohms) R = decimal point (1003 = 100,000 ohms)	Tolerance B = ±0.1% D = ±0.5% F = ±1.0%	Failure Rate Level — % per 1000 Hours (60% confidence) M = 1.0% P = 0.1% R = .01% S = .001%

## RESISTORS — ALPHABETICAL LISTING OF MILITARY PART NUMBERS

Military Part No.	Corning Part No.	Component Type	Page No.	Military Part No.	Corning Part No.	Component Type	Page No.
RL07	C4/C07	Resistor	62	RN65C	MC65/NC6	Resistor	54
RL20	C5/CS20	Resistor	62	RN70C	NC7	Resistor	54
RL32	C6/FP32	Resistor	62	RN55D	NA55	Resistor	56
RL42	FP42	Resistor	62	RN60D	NA60	Resistor	56
RLR05	HC3	Resistor	58	RN65D	NA65	Resistor	56
RLR07	HC4	Resistor	58	RN70D	NA70	Resistor	56
RLR20	HC5	Resistor	58	RN55E	NE55	Resistor	54
RLR32	HC6	Resistor	58	RN60E	NE60	Resistor	54
RN50C	NC3	Resistor	54	RN65E	ME65	Resistor	54
RN55C	NC55	Resistor	54	RNC55	MJ,MH,MK55	Resistor	60
RN60C	NC60	Resistor	54	RNC60	MJ,MH,MK60	Resistor	60

## RESISTORS — MILITARY SPECIFICATION CROSS-REFERENCE

Military Specification	Military Part No.	Corning Part No.	Page No.	Military Specification	Military Part No.	Corning Part No.	Page No.
MIL-R-10509 (Precision Metal Film Resistors)	RN50C	NC3	54	MIL-R-22684	RL07	C4/C07	62
	RN55C	NC55	54	(Semi-Precision Metal Film Resistors)	RL20	C5/CS20	62
	RN60C	NC60	54		RL32	C6/FP32	62
	RN65C	MC65/NC6	54		RL42	FP42	62
	RN70C	NC7	54	MIL-R-39017 (Established Reliability Semi-Precision Metal Film Resistors)	RLR05	HC3	58
	RN55D	NA55	56		RLR07	HC4	58
	RN60D	NA60	56		RLR20	HC5	58
	RN65D	NA65	56		RLR32	HC6	58
	RN70D	NA70	56	MIL-R-55182 (Established Reliability Precision Metal Film Resistors)	RNC55	MJ,MH,MK55	60
	RN55E	NE55	54		RNC60	MJ,MH,MK60	60
	RN60E	NE60	54				
	RN65E	ME65	54				

## RESISTORS — ALPHABETICAL LISTING OF CORNING PART NUMBERS

Corning Part No.	Military Part No.	Component Type	Page No.	Corning Part No.	Military Part No.	Component Type	Page No.
C3	None	Resistor	62	FP60E	None	Resistor	66
C4	RL07	Resistor	62	FP67	None	Resistor	64
C5	RL20	Resistor	62	FP69	None	Resistor	64
C6	RL32	Resistor	62	HC3	RLR05	Resistor	58
C05	None	Resistor	62	HC4	RLR07	Resistor	58
C07	RL07	Resistor	62	HC5	RLR20	Resistor	58
CS20	RL20	Resistor	62	HC6	RLR32	Resistor	58
FL4C	None	Resistor	68	L04C	None	Resistor	68
FL5C	None	Resistor	68	L05C	None	Resistor	68
FL4D	None	Resistor	68	L04D	None	Resistor	68
FL5D	None	Resistor	68	L05D	None	Resistor	68
FP¼	None	Resistor	64	MC65	RN65C	Resistor	54
FP½	None	Resistor	64	ME65	RN65E	Resistor	54
FP1	None	Resistor	64	MJ,MH,MK55	RNC55	Resistor	60
FP2	None	Resistor	64	MJ,MH,MK60	RNC60	Resistor	60
FP3	None	Resistor	64	NA55	RN55D	Resistor	56
FP4	None	Resistor	64	NA60	RN60D	Resistor	56
FP5	None	Resistor	64	NA65	RN65D	Resistor	56
FP7	None	Resistor	64	NA70	RN70D	Resistor	56
FP10	None	Resistor	64	NC3	RN50C	Resistor	54
FP32	RL32	Resistor	62	NC6	RN65C	Resistor	54
FP42	RL42	Resistor	62	NC7	RN70C	Resistor	54
FP55	None	Resistor	66	NC55	RN55C	Resistor	54
FP55C	None	Resistor	66	NC60	RN60C	Resistor	54
FP55E	None	Resistor	66	NE55	RN55E	Resistor	54
FP60	None	Resistor	66	NE60	RN60E	Resistor	54
FP60C	None	Resistor	66				



STATISTICAL DESIGN TOLERANCE

CONCEPT

From the designer's standpoint, circuits will continue to perform their function providing their components operate within the limits established during design. Optimum circuit design thus depends on predictability of total excursion from nominal characteristics.

Corning's statistical design tolerances introduce opportunities for circuit simplification, savings on associated components through predictable resistor performance, and standardizations in both inventories and manufacturing.

Corning has established statistical summations of all resistance deviations from nominal, both transitory and permanent, which provide dependable, low cost circuit design.

These summations include:

- 1. Initial resistance distribution related to purchase tolerance.
- 2. Changes in resistance resulting from temperature coefficient effects.
- 3. Changes in resistance due to environmental testing (moisture, temperature cycling, solder heat effect, and 1,000-hour load life).
- 4. 10,000-hour load life changes due to rated power dissipation.

Theory

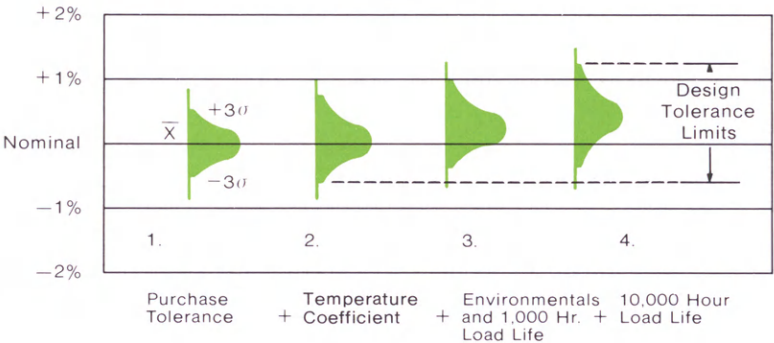
A continual sampling of resistance deviations due to purchase tolerance, temperature coefficient, environmental stress, and load life can be combined statistically when these characteristics have a normal or Gaussian distribution.

The end product is not sorted or selected for desired characteristics, but rather produced to specification. CORNING® resistors display normal distributions primarily due to manufacturing techniques that adhere rigidly to specified purchase tolerance and temperature coefficient specifications.

The curves illustrate the development of CORNING design tolerances, using accepted statistical techniques. The design tolerance is the calculated ΔR limit from first application of power through 10,000 hours load life.

APPLICATION

The circuit designer can apply CORNING metal film resistors within the design tolerance limits shown by the table below. These limits are given for the NA and C style resistors.



NA Style T.C. ± 100 ppm				C Style Multi-Use Resistors ± 100 ppm			
Corning Type	Rating Watts	Purch. Tol.	Design Tolerance Limits %	Corning Type	Rating Watts	Purch. Tol.	Design Tolerance Limits %
NA55	1/8 w @ 70°C	1/2 %, 1%	+ 1.25, -0.67 + 1.63, -1.00	C3	1/8 w @ 70°C	1%, 2%	+ 2.82, -1.84 + 3.12, -2.52
	1/10 w @ 125°C	1/2 %, 1%	+ 1.64, -1.13 + 1.91, -1.45		1/20 w @ 125°C	1%, 2%	+ 2.72, -1.84 + 3.35, -2.52
NA60	1/4 w @ 70°C	1/2 %, 1%	+ 1.49, -0.50 + 1.88, -1.00	C4	1/4 w @ 70°C	1%, 2%	+ 2.01, -1.24 + 2.81, -2.16
	1/8 w @ 125°C	1/2 %, 1%	+ 1.57, -0.62 + 1.90, -1.01		1/8 w @ 125°C	1%, 2%	+ 2.10, -1.42 + 2.87, -2.27
NA65	1/2 w @ 70°C	1/2 %, 1%	+ 2.00, -0.86 + 2.29, -1.00	C5	1/2 w @ 70°C	1%, 2%	+ 2.20, -1.00 + 3.05, -1.88
	1/4 w @ 125°C	1/2 %, 1%	+ 1.74, -0.76 + 2.01, -1.07		1/4 w @ 125°C	1%, 2%	+ 2.24, -1.14 + 3.06, -2.02

PROVEN STABILITY

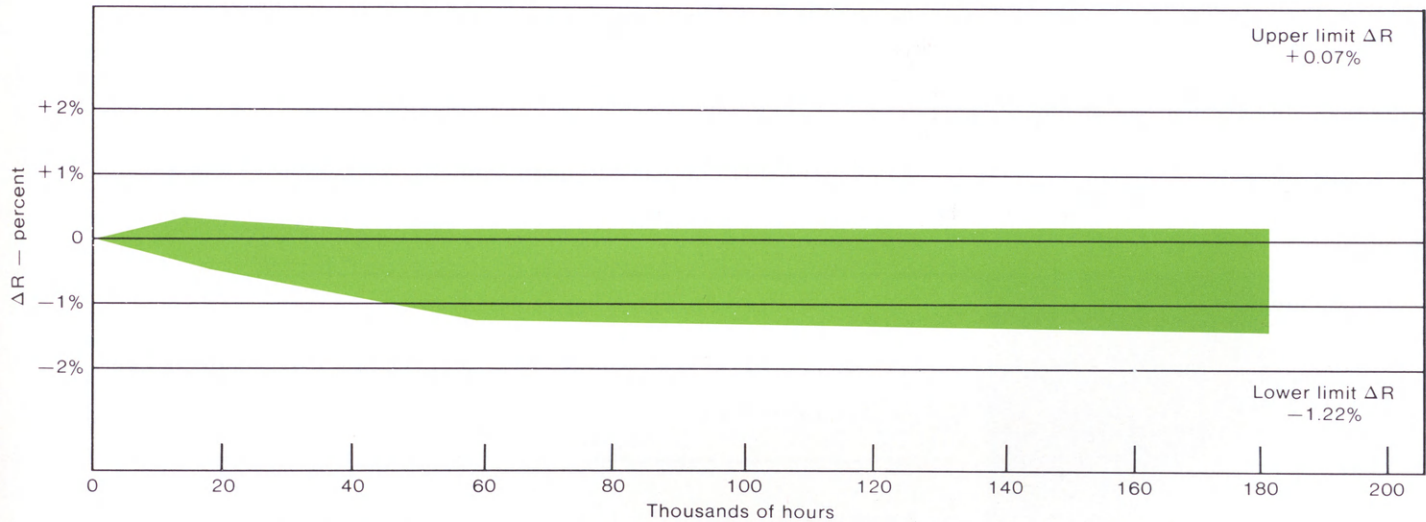
In 1956, Remington Rand Univac Division of Sperry Rand Corporation began testing 1500 CORNING® N20, ½ watt, 1% resistors in a 40°C ambient under various power stressing conditions. Resistance deviations resulting from this program were minimal

and unsurpassed in the industry. To confirm the stability characteristics demonstrated in the Remington Rand Univac test, Corning remounted 600 of the original resistors in an uncontrolled 25°C ambient early in 1962, accumulating over 180,000

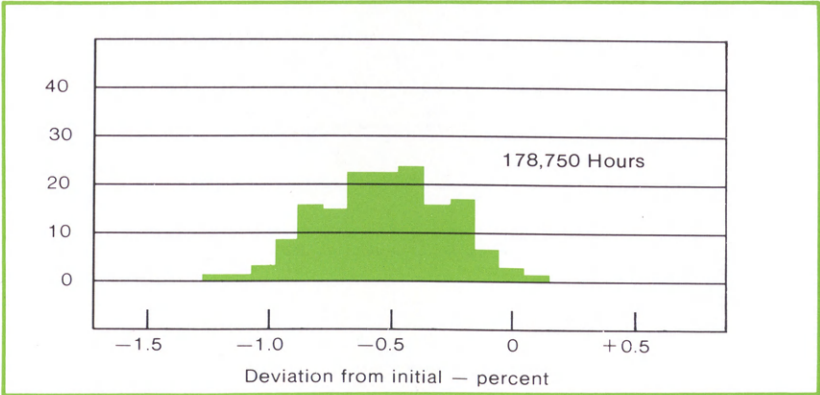
total test hours to date. Not a single unit has exceeded a 2% ΔR from initial resistance at time zero. The results of this added testing are shown below and will be of great value in evaluating CORNING metal film resistors for your circuit requirements.

Testing Procedures (Closely Simulating Typical Application)

Nominal Resistance (Ohms)	No. of Units in Group	Power Dissipation (Watts)	Percent of Rated Power	Total Test Hours To Present	Unit Hours
10,000	150	0.1	20	178,392	26,758,800
10,000	150	0.2	40	177,330	26,599,500
10,000	150	0.3	60	178,750	26,812,500
115,000	150	0.6	120	180,144	27,021,600
TOTALS	600				107,192,400



Extended Load Life Performance, CORNING Metal Film Resistors (10K, ½ Watt) at 0.3 Watt



Deviation Percentage at 0.3 Watt Dissipation for CORNING Resistors, 10K, 1% Purchase Tolerance, 150 Piece Life Test












# Metal Film Resistors—Precision

NE55, NE60, ME65 (Commercial) RN55E, RN60E, RN65E  
(QPL to MIL-R-10509)  $\pm 25$ PPM  
NC3, NC55, NC60, MC65, NC6, NC7 (Commercial) RN50C, RN55C, RN60C,  
RN65C, RN70C (QPL to MIL-R-10509)  $\pm 50$ PPM

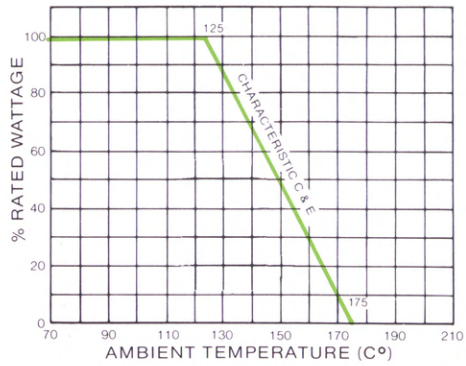
Corning's  $\pm 25$  and  $\pm 50$ ppm resistors provide the tight tolerance, tight temperature coefficient and operating stability required in today's precision circuits. These resistors feature the

low noise and low inductance characteristics of metal film technology. Standard resistance tolerances are 0.1, .25, .5, and 1%.

		Military (Commercial) Wattage Rating		Voltage Rating	Resistance Range	Standard Tolerance	Temperature Coefficient	Dimensions — Inches (mm) Body Length
Military Type	Corning Type	70°C	125°C					
Characteristic E ± 25PPM/°C								
 RN55E	RN55E	NE55	¼ ⅒	200	49.9Ω-1MΩ	.1, .25, .5, 1	± 25 PPM/°C	.245 ± .030 (6.1 ± .76)
 RN60E	RN60E	NE60	½ ¼	250	49.9Ω-1MΩ	.1, .25, .5, 1	± 25 PPM/°C	.375 ± .025 — .055 (9.5 ± .63) — 1.4)
 RN65E	RN65E	ME65	¼	300	49.9Ω-1MΩ	.1, .25, .5, 1	± 25 PPM/°C	.555 ± .030 — .020 (14.1 ± .76) — .51)
Characteristic C ± 50PPM/°C								
 RN50C	RN50C	NC3	⅒	200	49.9Ω-100K	.5, 1	± 50 PPM/°C	.145 ± .015 (3.68 ± .38)
 RN55C	RN55C	NC55	¼ ⅒	200	49.9Ω-1MΩ	.1, .25, .5, 1	± 50 PPM/°C	.245 ± .030 (6.1 ± .76)
 RN60C	RN60C	NC60	½ ¼	250	49.9Ω-1MΩ	.1, .25, .5, 1	± 50 PPM/°C	.375 ± .025 — .055 (9.5 ± .63) — 1.4)
 RN65C	RN65C	MC65	¼	300	49.9Ω-1MΩ	.1, .25	± 50 PPM/°C	.555 ± .030 — .020 (14.1 ± .76) — .51)
 RN65C	RN65C	NC6	¼	300	49.9Ω-1MΩ	.5, 1	± 50 PPM/°C	.554 ± .021 (14.07 ± .53)
 RN70C	RN70C	NC7	½	350	51.1Ω-1MΩ	.5, 1	± 50 PPM/°C	.719 ± .031 (18.26 ± .79)

Part Number Explanation on Page 56

MIL DERATING CURVES



Dimensions — Inches (mm) Body Diameter	Lead Diameter	Load Life 2000 Hours MIL Rating ΔR Max. ±%	Moisture Resistance ΔR Max. ±%	Thermal Shock ΔR Max. ±%	Short Time Overload ΔR Max. ±%	Low Temp. Operation ΔR Max. ±%	D.W.V. ΔR Max. ±%	Effect Solder Heat ΔR Max. ±%	Terminal Strength ΔR Max. ±%	Shock ΔR Max. ±%	Vibration ΔR Max. ±%
.088 ±.010 (2.24 ±.25)	.025 (.63)	0.5	0.5	0.25	0.25	0.25	0.1	0.1	0.1	0.1	0.1
.135 ±.020 (3.4 ±.51)	.025 (.63)	0.5	0.5	0.25	0.25	0.25	0.1	0.1	0.1	0.1	0.1
.178 ±.010 (4.52 ±.25)	.025 (.63)	0.5	0.5	0.25	0.25	0.25	0.1	0.1	0.1	0.1	0.1
.062 ±.004 (1.57 ±.10)	.016 (.41)	0.5	0.5	0.25	0.25	0.25	0.1	0.1	0.1	0.1	0.1
.088 ±.010 (2.24 ±.25)	.025 (.63)	0.5	0.5	0.25	0.25	0.25	0.1	0.1	0.1	0.1	0.1
.135 ±.020 (3.43 ±.51)	.025 (.63)	0.5	0.5	0.25	0.25	0.25	0.1	0.1	0.1	0.1	0.1
.178 ±.010 (4.52 ±.25)	.025 (.63)	0.5	0.5	0.25	0.25	0.25	0.1	0.1	0.1	0.1	0.1
.190 +.010 -.015 (4.83 ±.25) -.38)	.025 (.63)	0.5	0.5	0.25	0.25	0.25	0.1	0.1	0.1	0.1	0.1
.248 ±.015 (6.30 ±.38)	.032 (.81)	0.5	0.5	0.25	0.25	0.25	0.1	0.1	0.1	0.1	0.1

Part Marking Examples, Insulating Coatings, Color, Lead Materials and Other Information Available on Page 57.




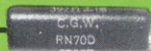


# Metal Film Resistors—Precision

NA55, NA60, NA65, NA70 (Commercial)  
RN55D, RN60D, RN65D, RN70D (QPL to MIL-R-10509)  $\pm 100\text{PPM}$

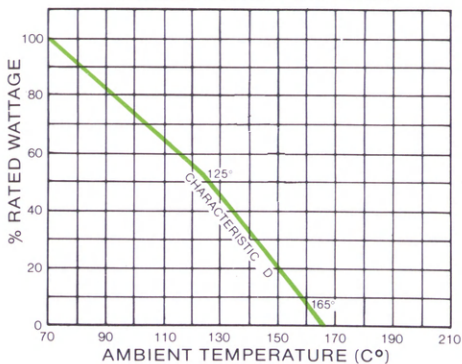
Precision metal film resistors for all circuit applications. Specifications meet or exceed those of MIL-R-10509. These resistors feature low noise and low inductance characteristics.

MIL-R-10509 specifies +200, -500-PPM/ $^{\circ}\text{C}$  as the temperature coefficient for D characteristic. Corning guarantees  $\pm 100\text{PPM}/^{\circ}\text{C}$  temperature coefficient.

		Military (Commercial)				Resistance Range	Standard Tolerance	Temperature Coefficient	Dimensions — Inches (mm) Body Length
Military Type	Corning Type	Wattage 70°C	Rating 125°C	Voltage Rating					
Characteristic D ± 100PPM/°C									
	RN55D	NA55	1/8 (1/4)	1/10 (1/8)	200	49.9Ω-150KΩ 10Ω-301KΩ	.5 1	± 100 PPM/°C	.225 ± .020 (5.71 ± .51)
	RN60D	NA60	1/4 (1/2)	1/8 (1/4)	300	49.9Ω-499KΩ 10Ω-1MΩ	.5 1	± 100 PPM/°C	.355 ± .020 (9.0 ± .51)
	RN65D	NA65	1/2	1/4	350	49.9Ω-1MΩ 10Ω-2MΩ	.5 1	± 100 PPM/°C	.554 ± .021 (14.07 ± .53)
	RN70D	NA70	3/4	1/2	500	51.1Ω-1MΩ	.5, 1	± 100 PPM/°C	.719 ± .031 (18.26 ± .79)
ACTUAL SIZE									

PART NUMBER EXPLANATION								
MILITARY						CORNING		
<u>RN</u>	<u>55</u>	<u>E</u>	<u>1002</u>	<u>F</u>	<u>NE</u>	<u>55</u>	<u>49.9R</u>	<u>1%</u>
Fixed film precision resistor (QPL to MIL-R-10509)	Case Size 50, 55, 60, 65, 70	Temperature Coefficient E = $\pm 25\text{PPM}$ C = $\pm 50\text{PPM}$ D = $\pm 100\text{PPM}$	Resistance in ohms. 3 significant figures plus multiplier or number of zeros to follow.	Resistance Tolerance B = $\pm .1\%$ C = $\pm .25\%$ D = $\pm .5\%$ F = $\pm 1\%$	Corning Style NE = $\pm 25\text{PPM}$ ME = $\pm 25\text{PPM}$ NC = $\pm 50\text{PPM}$ MC = $\pm 50\text{PPM}$ NA = $\pm 100\text{PPM}$	Case Size 50, 55, 60, 65, 70	Value in ohms R = ohms K = thousand ohms M = million ohms	Resistance Tolerance $\pm .1\%$ $\pm .25\%$ $\pm .5\%$ $\pm 1\%$

# MIL DERATING CURVES



CORNING

Dimensions — Inches (mm)		Load Life 1000 Hours MIL Rating $\Delta R$ Max. $\pm\%$	Moisture Resistance $\Delta R$ Max. $\pm\%$	Thermal Shock $\Delta R$ Max. $\pm\%$	Short Time Overload $\Delta R$ Max. $\pm\%$	Low Temp. Operation $\Delta R$ Max. $\pm\%$	D.W.V. $\Delta R$ Max. $\pm\%$	Effect Solder Heat $\Delta R$ Max. $\pm\%$	Terminal Strength $\Delta R$ Max. $\pm\%$	Shock $\Delta R$ Max. $\pm\%$	Vibration $\Delta R$ Max. $\pm\%$
Body Diameter	Lead Diameter										
.090 $\pm$ .008 (2.29 $\pm$ .20)	.025 (.63)	0.5	0.5	0.25	0.25	0.25	0.1	0.1	0.1	0.1	0.1
.148 $\begin{smallmatrix} +.000 \\ -.023 \end{smallmatrix}$ (3.76 $\begin{smallmatrix} +.000 \\ -.58 \end{smallmatrix}$ )	.025 (.63)	0.5	0.5	0.25	0.25	0.25	0.1	0.1	0.1	0.1	0.1
.190 $\begin{smallmatrix} +.010 \\ -.015 \end{smallmatrix}$ (4.83 $\begin{smallmatrix} +.25 \\ -.38 \end{smallmatrix}$ )	.025 (.63)	0.5	0.5	0.25	0.25	0.25	0.1	0.1	0.1	0.1	0.1
.248 $\pm$ .015 (6.30 $\pm$ .38)	.032 (.81)	0.5	0.5	0.25	0.25	0.25	0.1	0.1	0.1	0.1	0.1

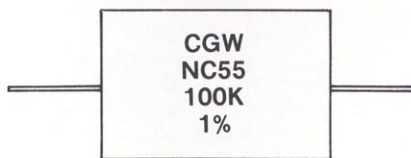
## PART MARKING EXAMPLES

### MILITARY (STANDARD)



CGW — Corning Glass Works  
NC55 — Style and Case Size  
RN55C — MIL Designation  
1003F — Value & tolerance

### COMMERCIAL (OPTIONAL)



CGW — Corning Glass Works  
NC55 — Style and Case Size  
100K — Value in ohms  
1% — Tolerance

**OTHER MARKING AVAILABLE** — Customer part number; color banding.

**INSULATING COATING** — ME65 and MC65 are molded silicone. All others are conformally coated with epoxy resin.

**COLOR** — Dark gray.

**LEAD MATERIAL** — Type C, per MIL-STD-1276 (weldable types available).

**OTHER INFORMATION AVAILABLE** — Frequency characteristics, inductance, noise.



# Metal Film Resistors—Established Reliability

## RLR05C, 07C, 20C, 32C (QPL to MIL-R-39017) Semi-Precision

MIL-R-39017 is the established reliability specification for semi-precision metal film resistors. It supersedes MIL-R-22684 which is now inactive for new design.

Revision C of MIL-R-39017 changed the temperature coefficient from  $\pm 200\text{PPM}/^\circ\text{C}$  to  $\pm 100\text{PPM}/^\circ\text{C}$  and added  $\pm 1\%$  purchase tolerance. Resistance value coding was changed from three digit to four digit for  $\pm 1\%$  and  $\pm 2\%$  tolerance.

Amendment 2 to MIL-R-39017 makes all  $\pm 5\%$  tolerance parts and  $\pm 2\%$  parts with 3 digit resistance coding *inactive for new design*. However, usage of these devices is permitted in many existing designs.

New designs should use either  $\pm 1\%$  or  $\pm 2\%$  tolerance parts with four digit resistance value coding and marking.

Extended life tests of over one-half billion unit test hours have proven the reliability

inherent in Corning's manufacturing process. This has been confirmed by field performance in high reliability programs such as: Minuteman, Safeguard, Mercury, Gemini, Apollo, Mariner, and Poseidon, as well as our involvement in virtually every other military program requiring resistors.

									Dimensions — Inches (mm) Lead Length
Military Type	Corning Type	Wattage 70°C	Voltage Rating	Resistance Range	Standard <sup>1</sup> Tolerance	Temperature Coefficient	Body Length		
RLR05	HC3	$\frac{1}{8}$	200	10Ω-150K	1, 2, 5%	$\pm 100\text{PPM}/^\circ\text{C}$	.145 $\pm$ .015 (3.68 $\pm$ .38)		1.25 $\pm$ .266 (31.8 $\pm$ 6.8)
RLR07	HC4	$\frac{1}{4}$	250	10Ω-300K	1, 2, 5%	$\pm 100\text{PPM}/^\circ\text{C}$	.225 $\pm$ .020 (5.71 $\pm$ .51)		1.5 $\pm$ .125 (38.1 $\pm$ 3.2)
RLR20	HC5	$\frac{1}{2}$	350	10Ω-1 Meg	1, 2, 5%	$\pm 100\text{PPM}/^\circ\text{C}$	.355 $\pm$ .020 (9.02 $\pm$ .51)		1.5 $\pm$ .125 (38.1 $\pm$ 3.2)
RLR32	HC6	1	500	10Ω-1 Meg	1, 2, 5%	$\pm 100\text{PPM}/^\circ\text{C}$	.554 $\pm$ .026 (14.07 $\pm$ .66) + .021 - .53		1.5 $\pm$ .125 (38.1 $\pm$ 3.2)

<sup>1</sup>5% tolerance is inactive for new design.

RLR

Established Reliability Fixed Film Resistor ( $\pm 100\text{PPM}/^\circ\text{C}$ )

20

Size Power rating at 70°C  
05 =  $\frac{1}{8}$  watt  
07 =  $\frac{1}{4}$  watt  
20 =  $\frac{1}{2}$  watt  
32 = 1 watt

C

Lead Material Type C Solderable/weldable.

1003

Coded Resistance Value ohms. First 3 digits are significant figures, fourth digit is the multiplier.  $\pm 5\%$  parts use a three digit code.

G

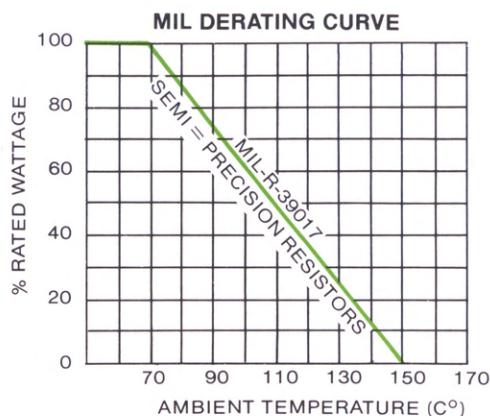
Tolerance  
J =  $\pm 5\%$   
G =  $\pm 2\%$   
F =  $\pm 1\%$

R

Failure Rate 1000 Hours (60% confidence)  
M = 1.0%  
P = 0.1%  
R = .01%

Life failure rate level (established at 60-percent confidence)

Failure-rate-level designation	Failure-rate percent/1,000 hours
M	1.0
P	0.1
R	0.01



#### MIL-R-39017

**INSULATING COATING** — Epoxy.

**COLOR** — Dark gray.

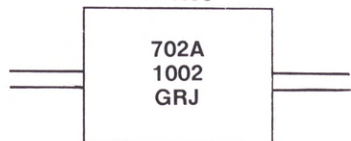
**LEAD MATERIAL** — Type C, per MIL-STD-1276 (weldable types available).

**OTHER INFORMATION AVAILABLE** — Frequency characteristics, noise, inductance and failure rate levels.

Dimensions — Inches (mm)		Load Life	Moisture	Thermal	Low Temp.	Low Temp.	Short Time	D.W.V.	Effect	Terminal	Shock & Vibration	Power Con-
Body Diameter	Lead Diameter	2000 Hours MIL Rating	Resistance	Shock	Storage	Operation	Overload		Solder Heat	Strength		ditioning
		$\Delta R$ Max. $\pm\%$	$\Delta R$ Max. $\pm\%$	$\Delta R$ Max. $\pm\%$	$\Delta R$ Max. $\pm\%$	$\Delta R$ Max. $\pm\%$	$\Delta R$ Max. $\pm\%$	$\Delta R$ Max. $\pm\%$	$\Delta R$ Max. $\pm\%$	$\Delta R$ Max. $\pm\%$	$\Delta R$ Max. $\pm\%$	$\Delta R$ Max. $\pm\%$
.062 $\pm$ .004 (1.57 $\pm$ .10)	.016 (.41)	2.0	.5	.25	.25	.25	.5	.1	.1	.1	.1	.5
.090 $\pm$ .008 (2.29 $\pm$ .20)	.025 (.61)	2.0	.5	.25	.25	.25	.5	.1	.1	.1	.1	.5
.148 $\pm$ .000 — .023 + .000 (3.76 $\pm$ .58)	.032 (.81)	2.0	.5	.25	.25	.25	.25	.1	.1	.1	.1	.5
.190 $\pm$ .010 — .015 + .025 (4.83 $\pm$ .38)	.040 (1.02)	2.0	.5	.25	.25	.25	.25	.1	.1	.1	.1	.5

#### PART MARKING EXAMPLES

RLR05



702A — Year, Week of Year, Lot Code  
1002 — Coded Resistance Value\*  
GRJ — Tol., FR, JAN

RLR07



712AJ — Year, Week of Year, Lot Code, JAN  
RLR7C — Style, Lead Material  
1002F — Coded Resistance Value\*, Tol.  
RCGW — FR, Corning Glass Works

RLR20  
RLR32



7711AJ — Year, Week of Year, Lot Code, JAN  
RLR\_\_C — Style, Lead Material  
1002GR — Coded Resistance Value\*, Tol., FR  
24546 — Source Code  
CGW — Corning Glass Works

\* $\pm 5\%$  tolerance parts are marked with 3 digit resistance value code, e.g. 103.  $\pm 2\%$  tolerance parts are marked with 4 digit code but may be special ordered with 3 digit code. All  $\pm 5\%$  parts and  $\pm 2\%$  parts with 3 digit coding are inactive for new design.

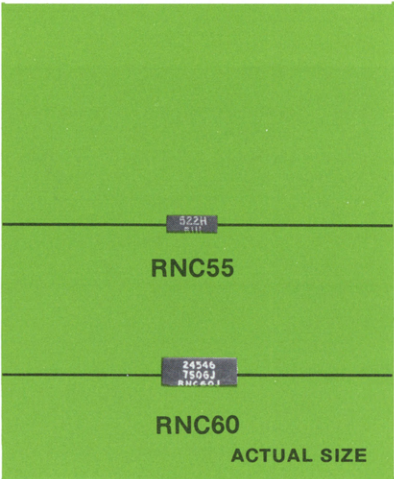


# Molded Metal Film Resistors—Precision Established Reliability MIL-R-55182

RNC55J/H/K, RNC60J/H/K, FR Level S  
RNR55J/H/K, RNR60J/H/K, FR Level S

CORNING® MJ, MH and MK Style resistors are designed for the many military applications where established reliability is a must.

Extended life tests of over one hundred million unit test hours have proven the reliability inherent in Corning's manufacturing process.



Military Type	Corning Type	Military		Voltage Rating	Resistance Range	Standard Tolerance	Temperature Coefficient	Dimensions — Inches (mm) Body Length
		Wattage 70°C	Rating 125°C					
RNC55J/ RNR55J	MJ55	1/8	1/10	200	49.9Ω-301K	.1, .5, 1%	±25PPM/°C	.270 ± .010 (6.86 ± .25)
RNC55H/ RNR55H	MH55	1/8	1/10	200	10Ω-48.7Ω 49.9Ω-301K	.5, 1% .1, .5, 1%	±50PPM/°C	
RNC55K/ RNR55K	MK55	1/8	1/10	200	10Ω-301K	.5, 1%	±100PPM/°C	
RNC60J/ RNR60J	MJ60	1/4	1/8	250	49.9Ω-499K	.1, .5, 1%	±25PPM/°C	.410 ± .015 (10.41 ± .38)
RNC60H/ RNR60H	MH60	1/4	1/8	250	10Ω-48.7Ω 49.9Ω-499K	.5, 1% .1, .5, 1%	±50PPM/°C	
RNC60K/ RNR60K	MK60	1/4	1/8	250	10Ω-499K	.5, 1%	±100PPM/°C	

RNC

Established Reliability Precision Molded Metal Film Resistor.  
RNC with solderable/weldable leads.  
RNR with solderable leads.

55

Case Size  
55  
60

H

Characteristic  
J = non-hermetic ± 25PPM/°C  
H = non-hermetic ± 50PPM/°C  
K = non-hermetic ± 100 PPM/°C

1001

Coded Resistance Value. First 3 digits are significant figures, fourth digit is the multiplier.

F

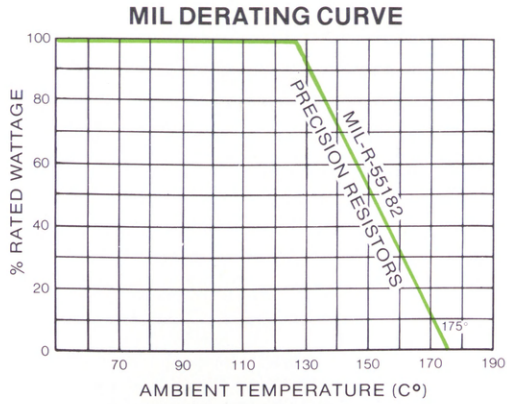
Tolerance  
B = ± 0.1%  
D = ± 0.5%  
F = ± 1.0%

S

Failure Rate Level — % per 1000 Hours (60% confidence)  
M = 1.0%  
P = 0.1%  
R = .01%  
S = .001%

Life failure rate level (established at 60-percent confidence)

Failure-rate-level designation	Failure-rate percent/1,000 hours
M	1.0
P	0.1
R	0.01
S	0.001

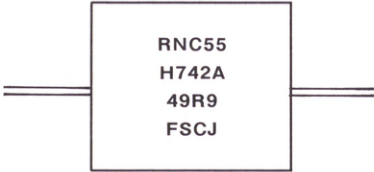


CORNING

Dimensions — Inches (mm)		Load Life	Moisture	Overload	Low		Effect	Terminal	Shock	Vibration	High
Body Diameter	Lead Diameter	2000 Hours MIL Rating	Resistance	and Thermal Shock	Temp. Operation	D.W.V.	Solder Heat	Strength			Temp. Exposure
		Δ R Max. ±%	Δ R Max. ±%	Δ R Max. ±%	Δ R Max. ±%	Δ R Max. ±%	Δ R Max. ±%	Δ R Max. ±%	Δ R Max. ±%	Δ R Max. ±%	Δ R Max. ±%
.098 + .002 — .003 (2.49 ± .05)	.025 (.63)	0.5	0.4	0.2	0.15	0.1	0.1	0.1	0.1	0.1	0.5
.160 ± .005 (4.06 ± .38)	.025 (.63)	0.5	0.4	0.2	0.15	0.1	0.1	0.1	0.1	0.1	0.5

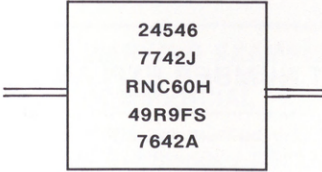
**PART MARKING EXAMPLES**

**RNC55**



RNC55 — Style and Terminal  
H742A — Char., Date Code, Prod. Lot Code  
49R9 — Value  
FSCJ — Tol., FR, Term., and JAN

**RNC60**



24546 — Source Code  
7742J — Date Code and JAN  
RNC60H — Style, Term., and Char.  
49R9FS — Value, Tol., and FR  
7642A — Production Lot Code

**MIL-R-55182**  
**INSULATING COATING** — Molded Silicone.  
**COLOR** — Dark gray.  
**LEAD MATERIAL** — Type C, per MIL-STD-1276 and type R.












# Metal Film Resistors – Semi-Precision

C3, C4, C5, C6 (Commercial) RL07, 20, 32, (QPL to MIL-R-22684)  
C05, C07, CS20, FP32, 42 (Commercial) RL07, 20, 32, 42 (QPL to MIL-R-22684)

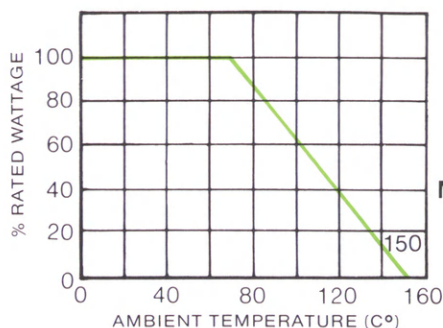
Corning's Semi-Precision Resistors offer • Long Term Stability • Low Inductance • Low Noise • Low Cost • QPL to MIL-R-22684

Ideal for preamplifiers, RF and IF circuits, and other general purpose usage.

	Military Type	Corning Type	Military (Commercial) Wattage Rating 70°C 125°C		Voltage Rating	Resistance Range	Standard Tolerance	Temperature Coefficient	Dimensions— Inches (mm) Body Length
Temperature Coefficient ± 100 PPM/°C Standard Tolerance 1, 2, 5%									
	—	(C3)	(1/8)	(1/10)	200	10Ω -150K	1, 2, 5%	±100PPM/°C	.145 ± .015 (3.68 ± .38)
	RL07S	(C4)	1/4	(1/8)	250	10Ω -301K	1, 2, 5%	±100PPM/°C	.225 ± .020 (5.71 ± .51)
	RL20S	(C5)	1/2	(1/4)	350	10Ω -1 Meg	1, 2, 5%	±100PPM/°C	.355 ± .020 (9.02 ± .51)
	RL32S	(C6)	1	(1/2)	500	10Ω -2 Meg	1, 2, 5%	±100PPM/°C	.554 ± .021 (14.07 ± .53)
Temperature Coefficient ± 200 PPM/°C Standard Tolerance 2, 5, 10%									
	—	(C05)	(1/8)		200	10Ω -150K	2, 5, 10%	±200PPM/°C	.145 ± .015 (3.68 ± .38)
	RL07S	(C07)	1/4		250	10Ω -301K	2, 5, 10%	±200PPM/°C	.225 ± .020 (5.71 ± .51)
	RL20S	(CS20)	1/2		350	10Ω -1 Meg	2, 5, 10%	±200PPM/°C	.355 ± .020 (9.02 ± .51)
	RL32S	(FP32)	1		500	10Ω -1 Meg	2, 5, 10%	±200PPM/°C	.560 ± .030 (14.27 ± .76)
	RL42S	(FP42)	2		500	10Ω -1.5 Meg	2, 5, 10%	±200PPM/°C	.687 ± .031 (17.45 ± .79)

FP42    ACTUAL SIZE

PART NUMBER EXPLANATION									
MILITARY					COMMERCIAL				
RL	20	S	104	G	C	5	100K	2%	
Fixed Film Resistor (QPL to MIL-R 22684)	Case Size 07 20 32 42	Solderable Lead	Resistance value in ohms. First 2 digits are significant figures, 3rd digit is the multiplier	Resistance Tolerance G = ±2% J = ±5%	Style C CS FP	Case Size 3 4 5 6 05 07 20 32 42	Value in ohms R = ohms K = thousand ohms M = million ohms	Resistance Tolerance ±1% ±2% ±5% ±10%	

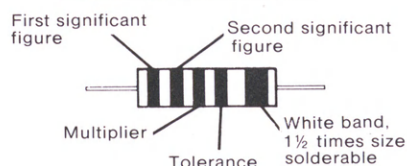


Dimensions— Inches (mm) Body Diameter	Lead Diameter	Load Life 1000 Hours MIL Rating ΔR Max. ± %	Moisture Resistance ΔR Max. ± %	Thermal Shock ΔR Max. ± %	Short Time Overload ΔR Max. ± %	Low Temp. Operation ΔR Max. ± %	D.W.V. ΔR Max. ± %	Effect Solder Heat ΔR Max. ± %	Terminal Strength ΔR Max. ± %	Shock ΔR Max. ± %	Vibration ΔR Max. ± %
.062 ± .004 (1.57 ± .10)	.016* (.41)	1.0	0.5	0.25	0.5	0.25	0.1	0.1	0.2	0.1	0.1
.090 ± .008 (2.29 ± .20)	.025 (.63)	1.0	0.5	0.25	0.25	0.25	0.1	0.1	0.1	0.1	0.1
.148 + .000 — .023 (3.76 + .00 — .58)	.032 (.81)	1.0	0.5	0.25	0.25	0.5	0.1	0.1	0.1	0.1	0.1
.190 + .010 — .015 (4.83 + .25 — .38)	.040 (1.02)	2.0	0.5	0.25	0.25	0.5	0.1	0.1	0.1	0.1	0.1
.062 ± .004 (1.57 ± .10)	.016 (.41)	1.0	0.5	0.25	0.5	0.25	0.1	0.1	0.2	0.1	0.1
.090 ± .008 (2.29 ± .20)	.025 (.63)	2.0	0.5	0.25	0.5	0.25	0.1	0.1	0.1	0.1	0.1
.148 + .000 — .023 (3.76 + .000 — .58)	.032 (.81)	1.5	1.5	1.0	0.5	0.5	0.5	0.5	0.5	0.5	0.5
.190 + .010 — .015 (4.83 + .25 — .38)	.040 (1.02)	2.0	1.5	1.0	0.5	0.5	0.5	0.5	0.5	0.5	0.5
.315 ± .010 (8.00 ± .25)	.045** (1.14)	3.0	1.0	1.0	0.5	0.5	0.5	0.5	0.5	0.5	0.5

\*.020" also available      \*\*.032" also available

## PART MARKING EXAMPLES

### MILITARY

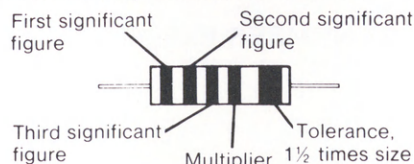


5 Band, MIL-R-22684

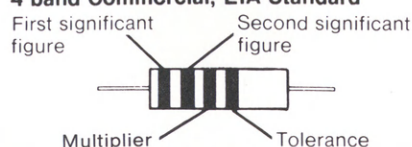
**COLOR CODE** — For color code explanation see page 70.

### COMMERCIAL

**1% Tolerance Parts are marked with 5 color bands. 5 band, EIA Standard RS279.\***



**2, 5 & 10% Tolerance Parts are marked with 4 color bands. 4 band Commercial, EIA Standard**



\*C3, 1% tolerance part is typemarked.

**OTHER MARKING AVAILABLE** — Type marking.

**INSULATING COATING** — Epoxy resin for "C" styles, flameproof ceramic for "FP" styles.

**COLOR** — Dark gray for "C" styles, medium blue for "FP" styles.

**LEAD MATERIAL** — Type C, per MIL-STD-1276 (weldable types available).

**OTHER INFORMATION AVAILABLE** — Frequency characteristics, inductance, noise.



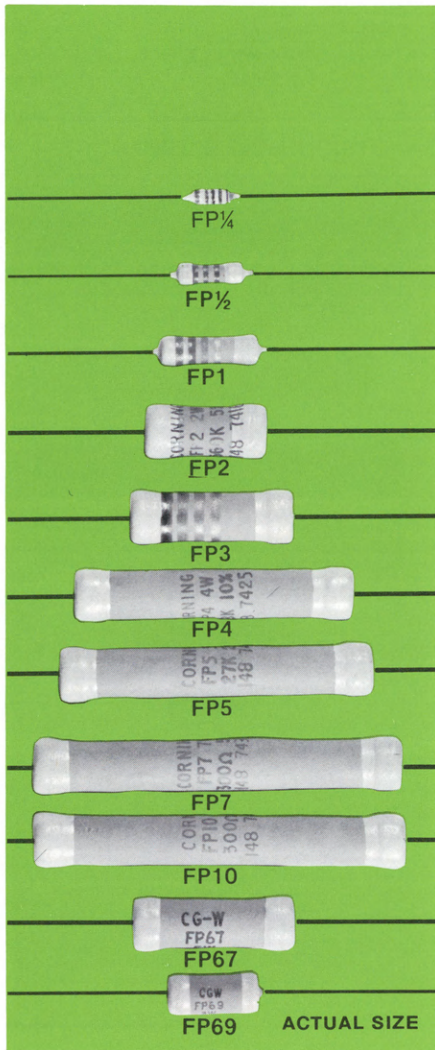
# Metal Film Resistors-Flameproof

FP¼, ½, 1, 2, 3, 4, 5, 7, 10, 67, 69 Commercial Flameproof

CORNING® FP Style Resistors are especially suited for circuitry where functions, environments and duty

cycles demand small, low-power resistors with exceptional frequency characteristics, low end cost and the

ability to withstand overloads up to 100 times rated power without any trace of flame.



Corning Type	Wattage Rating 25°C	Wattage Rating 40°C	Wattage Rating 70°C	Voltage Rating	Resistance Range	Standard Tolerance	Temperature Coefficient	Dimensions— Inches (mm) Body Length
FP¼	—	—	¼ W	250	10Ω-301K	1, 2, 5, 10%	±100PPM/°C	.380 Max.* (9.65 Max.)
FP½	—	—	½ W	350	10Ω-1 Meg	1, 2, 5, 10%	±150PPM/°C	.360 ± .020 (9.14 ± .51)
FP1	—	—	1 W	500	10Ω-1 Meg	1, 2, 5, 10%	±150PPM/°C	.560 ± .031 (14.22 ± .79)
FP2	3½	3	2	500	9Ω-1.5 Meg	1, 2, 5, 10%	±200PPM/°C	.687 ± .031 (17.45 ± .79)
FP3	4	4	3	500	9Ω-125K	1, 2, 5, 10%	±200PPM/°C	.900 ± .055 (22.86 ± 1.40)
FP4	5½	5	4	500	16Ω-125K	1, 2, 5, 10%	±200PPM/°C	1.530 ± .035 (38.86 ± .89)
FP5	6½	6	5	600	19Ω-125K	1, 2, 5, 10%	±200PPM/°C	1.710 ± .035 (43.43 ± .89)
FP7	7½	—	7	700	24Ω-125K	1, 2, 5, 10%	±200PPM/°C	2.040 ± .035 (51.82 ± .89)
FP10	—	10	—	700	24Ω-125K	1, 2, 5, 10%	±200PPM/°C	2.040 ± .035 (51.82 ± .89)
FP67	5	—	—	500	5Ω-19K	1, 2, 5, 10%	±200PPM/°C	.900 ± .055 (22.86 ± 1.40)
FP69	3	—	—	350	2.6Ω-1 Meg	1, 2, 5, 10%	±200PPM/°C	.516 ± .021 (13.11 ± .53)

\*Clean Lead to Clean Lead

## PART NUMBER EXPLANATION

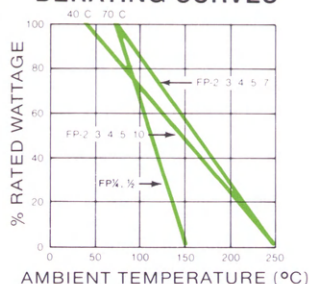
FP  
Flameproof  
Resistor

2  
Case Size  
¼, ½, 1  
2, 3  
4, 5  
7, 10  
67, 69

51.1K  
Value in ohms  
R = Ohms  
K = Thousand Ohms  
M = Million Ohms  
51.1K = 51100 Ohms  
51.1R = 51.1 Ohms

± 1%  
Tolerance  
± 1%  
± 2%  
± 5%  
± 10%

## DERATING CURVES

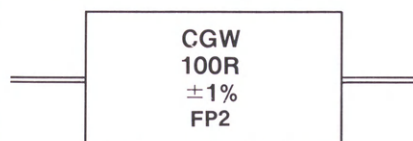


CORNING

Dimensions Inches (mm) Body Diameter	Lead Diameter	Load Life 1000 Hours Rated Cond. ΔR Max. ± %	Moisture Resistance ΔR Max. ± %	Temp. Cycle ΔR Max. ± %	Short Time Overload ΔR Max. ± %	Low Temp. Operation ΔR Max. ± %	D.W.V. ΔR Max. ± %	Effect Solder Heat ΔR Max. ± %	Terminal Strength ΔR Max. ± %	Shock ΔR Max. ± %	Vibration ΔR Max. ± %
.088 ± .008 (2.23 ± .20)	.025 (.63)	1.0	1.0	0.5	0.5	0.5	0.5	0.25	0.25	0.5	0.5
.138 ± .012 — .023 (3.51 ± .30 — .58)	.032 (.81)	1.0	1.0	1.0	0.5	0.5	0.5	0.5	0.5	0.5	0.5
.190 ± .010 — .015 (4.83 ± .25 — .38)	.032** (.81)	2.0	1.5	1.0	1.0	0.5	0.5	0.5	0.5	0.5	0.5
.310 ± .010 (7.87 ± .25)	.032*** (.81)	5.0	1.0	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
.310 ± .010 (7.87 ± .25)	.032 (.81)	5.0	1.0	1.0	0.5	0.5	0.5	0.5	0.5	0.5	0.5
.310 ± .010 (7.87 ± .25)	.032 (.81)	5.0	1.0	1.0	0.5	0.5	0.5	0.5	0.5	0.5	0.5
.310 ± .010 (7.87 ± .25)	.032 (.81)	5.0	1.0	1.0	0.5	0.5	0.5	0.5	0.5	0.5	0.5
.310 ± .010 (7.87 ± .25)	.032 (.81)	5.0	1.0	1.0	0.5	0.5	0.5	0.5	0.5	0.5	0.5
.310 ± .010 (7.87 ± .25)	.032 (.81)	5.0	1.0	1.0	0.5	0.5	0.5	0.5	0.5	0.5	0.5
.310 ± .010 (7.87 ± .25)	.032 (.81)	5.0	1.0	1.0	0.5	0.25	0.25	0.25	0.25	0.5	0.5
.225 ± .012 (5.71 ± .30)	.032 (.81)	3.0	1.0	0.5	0.5	0.25	0.25	0.25	0.5	0.5	0.5

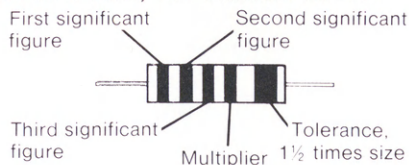
\*\*Available .040" lead \*\*\*Available .045" lead

## PART MARKING EXAMPLES

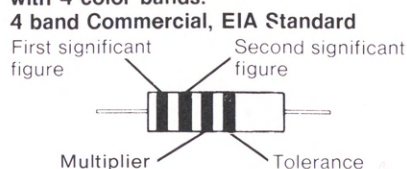


CGW — Corning Glass Works  
100R — Value in ohms  
±1% — Tolerance  
FP2 — Style and Case Size  
(Date and source code  
included on some styles)

1% Tolerance Parts are marked with 5 color bands. 5 band, EIA Standard RS279.



2, 5 & 10% Tolerance Parts are marked with 4 color bands. 4 band Commercial, EIA Standard



INSULATING COATING —

Flameproof ceramic

COLOR — Medium blue.

LEAD MATERIAL — Type C, per MIL-STD-1276 (weldable types available).

OTHER INFORMATION AVAILABLE

— Frequency characteristics, inductance, noise.






COLOR CODE — For color code explanation see page 70.



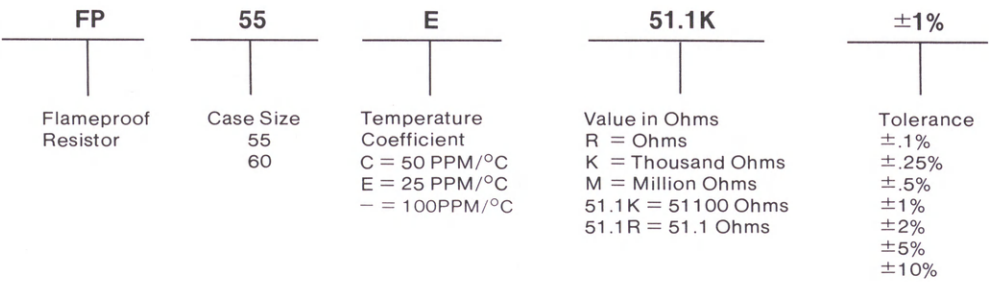
# Metal Film Resistors–Precision Flameproof

FP55E, FP60E, FP55C, FP60C, FP55, FP60

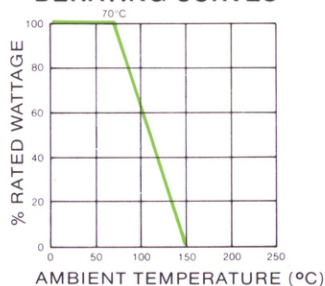
These flameproof resistors are especially suited for tight tolerance and tight temperature coefficient circuit applications.

	Corning Type	Wattage Rating 70°	Voltage Rating	Resistance Range	Standard Tolerance	Temperature Coefficient	Dimensions — Inches (mm) Body Length
Characteristic E ± 25PPM/°C							
 FP55E	FP55E	¼	200	49.9Ω-200KΩ	⅒, ¼, ½, 1%	±25PPM/°C	0.380 Max.* (9.65)
 FP60E	FP60E	½	250	49.9Ω-511KΩ	⅒, ¼, ½, 1%	±25PPM/°C	.350 ± .030 (8.89 ± .76)
Characteristic C ± 50PPM/°C							
 FP55C	FP55C	¼	200	49.9Ω-200KΩ	⅒, ¼, ½, 1%	±50PPM/°C	0.380 Max.* (9.65)
 FP60C	FP60C	½	250	49.9Ω-511KΩ	⅒, ¼, ½, 1%	±50PPM/°C	.350 ± .030 (8.89 ± .76)
± 100PPM/°C							
 FP55	FP55	¼	250	10Ω-301KΩ	1, 2, 5, 10%	±100PPM/°C	.225 ± .020 (5.72 ± .51)
 FP60	FP60	½	350	10Ω-1MΩ	1, 2, 5, 10%	±100PPM/°C	.355 ± .020 (9.02 ± .51)
ACTUAL SIZE				*Clean lead to clean lead.			

## PART NUMBER EXPLANATION



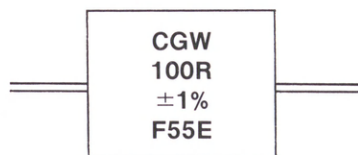
## DERATING CURVES



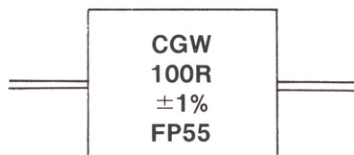
CORNING

Dimensions — Inches (mm)	Lead Diameter	Load Life 1000 Hours MIL Rating $\Delta R$ Max. $\pm\%$	Moisture Resistance $\Delta R$ Max. $\pm\%$	Thermal Shock $\Delta R$ Max. $\pm\%$	Short Time Overload $\Delta R$ Max. $\pm\%$	Low Temp. Operation $\Delta R$ Max. $\pm\%$	D.W.V. $\Delta R$ Max. $\pm\%$	Effect Solder Heat $\Delta R$ Max. $\pm\%$	Terminal Strength $\Delta R$ Max. $\pm\%$	Shock $\Delta R$ Max. $\pm\%$	Vibration $\Delta R$ Max. $\pm\%$
.100 Max. (2.54)	.025 (.63)	.5	.5	.25	.25	.25	.1	.1	.1	.1	.1
.130 <sup>+.015</sup> — .025 (3.30 <sup>+.38</sup> — .63)	.025 (.63)	.5	.5	.25	.25	.25	.1	.1	.1	.1	.1
.100 Max. (2.54)	.025 (.63)	.5	.5	.25	.25	.25	.1	.1	.1	.1	.1
.130 <sup>+.015</sup> — .025 (3.30 <sup>+.38</sup> — .63)	.025 (.63)	.5	.5	.25	.25	.25	.1	.1	.1	.1	.1
.090 $\pm$ .008 (2.29 $\pm$ .20)	.025 (.63)	1.0	1.0	.5	.5	.5	.5	.25	.25	.5	.5
.148 <sup>+.000</sup> — .023 (3.76 <sup>+.0</sup> — .58)	.032 (.81)	1.0	1.0	.5	.5	.5	.5	.5	.5	.5	.5

## PART MARKING EXAMPLES



CGW — Corning Glass Works  
100R — Value in Ohms  
 $\pm 1\%$  — Tolerance  
F55E — Style, Case Size  
and Temperature  
Coefficient



CGW — Corning Glass Works  
100R — Value in Ohms  
 $\pm 1\%$  — Tolerance  
FP55 — Style and Case Size

**INSULATING COATING** — Flameproof ceramic (FP55 and FP60 have epoxy overcoat.)

**COLOR** — Medium Blue

**LEAD MATERIAL** — Type C, per MIL-STD-1276 (weldable types available)

**OTHER INFORMATION AVAILABLE** — Frequency characteristics, inductance, noise.

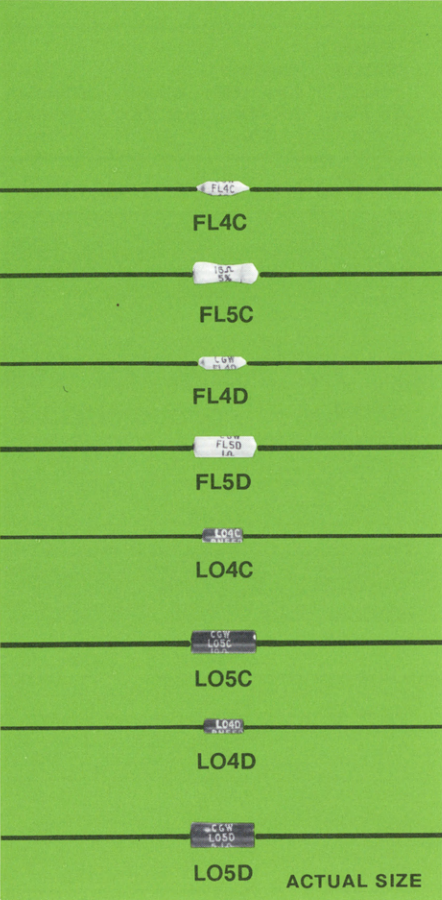
PACKAGING



# Metal Film Resistors—Low Resistance

FL4C, FL5C, FL4D, FL5D  
LO4C, LO5C, LO4D, LO5D

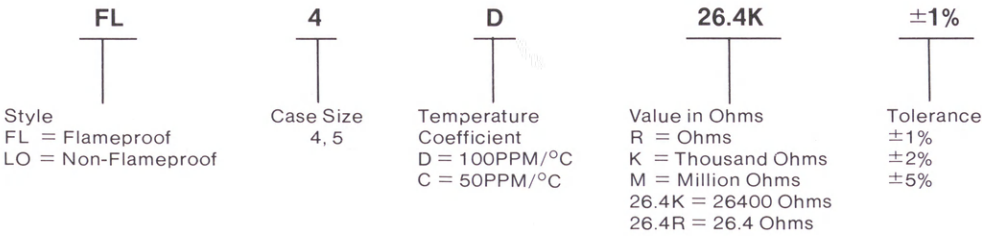
These styles provide low value resistors in both flameproof and non-flameproof construction. Temperature coefficients as tight as 50PPM/°C are available.



Corning Type	Equiv. Military (Commercial)		Voltage Rating	Resistance Range	Standard Tolerance	Temperature Coefficient	Dimensions — Inches (mm) Body Length
	Wattage 70°C	Rating 125°C					
FL4C	¼		250	1Ω-48.7Ω	1, 2, 5%	±50PPM/°C	0.380 Max* (9.65)
FL5C	½		350	1Ω-48.7Ω	1, 2, 5%	±50PPM/°C	0.350 ± .030 (8.89 ± .76)
FL4D	¼		250	1Ω-9.76Ω	1, 2, 5%	±100PPM/°C	0.380 Max* (9.65)
FL5D	½		350	1Ω-9.76Ω	1, 2, 5%	±100PPM/°C	0.350 ± .030 (8.89 ± .76)
LO4C	⅛ (¼)	⅒	200	1Ω-48.7Ω	1, 2, 5%	±50PPM/°C	0.225 ± 0.020 (5.72 ± .51)
LO5C	¼ (½)	⅛	350	1Ω-48.7Ω	1, 2, 5%	±50PPM/°C	0.355 ± .020 (9.02 ± .51)
LO4D	⅛ (¼)	⅒	200	1Ω-9.76Ω	1, 2, 5%	±100PPM/°C	0.225 ± 0.020 (5.72 ± .51)
LO5D	¼ (½)	⅛	350	1Ω-9.76Ω	1, 2, 5%	±100PPM/°C	0.355 ± .020 (9.02 ± .51)

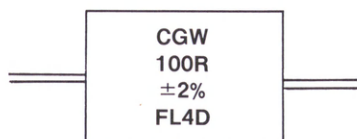
\*Clean Lead to clean lead.

## PART NUMBER EXPLANATION



Dimensions — Inches (mm) Body Diameter	Lead Diameter	Load Life 1000 Hours MIL Rating $\Delta R$ Max. $\pm\%$	Moisture Resistance $\Delta R$ Max. $\pm\%$	Thermal Shock $\Delta R$ Max. $\pm\%$	Short Time Overload $\Delta R$ Max. $\pm\%$	Low Temp. Operation $\Delta R$ Max. $\pm\%$	D.W.V. $\Delta R$ Max. $\pm\%$	Effect Solder Heat $\Delta R$ Max. $\pm\%$	Terminal Strength $\Delta R$ Max. $\pm\%$	Shock $\Delta R$ Max. $\pm\%$	Vibration $\Delta R$ Max. $\pm\%$
0.088 $\pm$ .010 (2.24 $\pm$ .25)	.025 (.63)	1.0	1.0	0.25	0.50	0.25	0.10	0.25	0.10	0.10	0.10
.130 $\begin{smallmatrix} +.015 \\ -.025 \end{smallmatrix}$ (3.30 $\begin{smallmatrix} +.38 \\ -.63 \end{smallmatrix}$ )	.032 (.81)	1.0	1.0	0.25	0.50	0.25	0.10	0.25	0.10	0.10	0.10
0.088 $\pm$ .010 (2.24 $\pm$ .25)	.025 (.63)	1.0	1.0	0.25	0.50	0.25	0.10	0.25	0.10	0.10	0.10
.130 $\begin{smallmatrix} +.015 \\ -.025 \end{smallmatrix}$ (3.30 $\begin{smallmatrix} +.38 \\ -.63 \end{smallmatrix}$ )	.032 (.81)	1.0	1.0	0.25	0.50	0.25	0.10	0.25	0.10	0.10	0.10
0.090 $\pm$ .008 (2.29 $\pm$ .20)	.025 (.63)	1.0	1.0	0.25	0.50	0.25	0.10	0.25	0.10	0.10	0.10
0.148 $\begin{smallmatrix} +.000 \\ -.023 \end{smallmatrix}$ (3.76 $\begin{smallmatrix} +.000 \\ -.58 \end{smallmatrix}$ )	.032 (.81)	1.0	1.0	0.25	0.50	0.25	0.10	0.25	0.10	0.10	0.10
0.090 $\pm$ .008 (2.29 $\pm$ .20)	.025 (.63)	1.0	1.0	0.25	0.50	0.25	0.10	0.25	0.10	0.10	0.10
0.148 $\begin{smallmatrix} +.000 \\ -.023 \end{smallmatrix}$ (3.76 $\begin{smallmatrix} +.000 \\ -.58 \end{smallmatrix}$ )	.032 (.81)	1.0	1.0	0.25	0.50	0.25	0.10	0.25	0.10	0.10	0.10

# PART MARKING EXAMPLE



CGW — Corning Glass Works  
100R — Value in Ohms  
 $\pm 2\%$  — Tolerance  
FL4D — Style, Case Size and  
Temperature Coefficient

**INSULATING COATING AND COLOR** — FL is a medium blue flame-proof ceramic. LO is a dark grey epoxy resin.

**LEAD MATERIAL** — Type C, per MIL-STD-1276 (weldable types available).

**OTHER INFORMATION AVAILABLE** — Frequency characteristics, inductance, noise.



CUSTOM NON-STANDARD CAPABILITIES

Many special resistor requirements can be fulfilled by calling the Resistor Customer Engineering Department in Bradford, Pennsylvania, (814) 362-5571. Some of these "special" capabilities are:

- Non-standard marking, serialization, date code
- Weldable leads, gold-plated nickel and domet
- Non-standard lead diameters
- Packaging, see page 72.

With our addition of more sophisticated test equipment, Corning can now offer custom testing or screening such as:

- 100% noise sort, temperature cycle
- Burn-in @ various power overload levels
- Group A, B, C type tests
- Customer acceptance programs
- Tolerance distributions
- Life test
- Degradation tests
- Temperature Coefficient Matching

Corning is also equipped to perform 100% non-destructive radiographic (x-ray) inspection of finished components. Characteristics that can be detected are:

- Resistive element alignment
- Coating voids
- Foreign materials
- Heterogeneities of materials.
- Broken, abraded, distorted element

Details of x-ray equipment such as focal points are available upon request.

Standard Resistance Values													
PURCHASE TOLERANCE													
B-.1% C-.25% D-.5%	F-1%	B-.1% C-.25% D-.5%	F-1%	B-.1% C-.25% D-.5%	F-1%	B-.1% C-.25% D-.5%	F-1%	B-.1% C-.25% D-.5%	F-1%	B-.1% C-.25% D-.5%	F-1%	B-.1% C-.25% D-.5%	F-1%
10.0	10.0	14.7	14.7	21.5	21.5	31.6	31.6	46.4	46.4	68.1	68.1	10	
10.1	....	14.9	....	21.8	....	32.0	....	47.0	....	69.0	....	11	
10.2	10.2	15.0	15.0	22.1	22.1	32.4	32.4	47.5	47.5	69.8	69.8	12	
10.4	....	15.2	....	22.3	....	32.8	....	48.1	....	70.6	....	13	
10.5	10.5	15.4	15.4	22.6	22.6	33.2	33.2	48.7	48.7	71.5	71.5	15	
10.6	....	15.6	....	22.9	....	33.6	....	49.3	....	72.3	....	16	
10.7	10.7	15.8	15.8	23.2	23.2	34.0	34.0	49.9	49.9	73.2	73.2	18	
10.9	....	16.0	....	23.4	....	34.4	....	50.5	....	74.1	....	20	
11.0	11.0	16.2	16.2	23.7	23.7	34.8	34.8	51.1	51.1	75.0	75.0	22	
11.1	....	16.4	....	24.0	....	35.2	....	51.7	....	75.9	....	24	
11.3	11.3	16.5	16.5	24.3	24.3	35.7	35.7	52.3	52.3	76.8	76.8	27	
11.4	....	16.7	....	24.6	....	36.1	....	53.0	....	77.7	....	30	
11.5	11.5	16.9	16.9	24.9	24.9	36.5	36.5	53.6	53.6	78.7	78.7	33	
11.7	....	17.2	....	25.2	....	37.0	....	54.2	....	79.6	....	36	
11.8	11.8	17.4	17.4	25.5	25.5	37.4	37.4	54.9	54.9	80.6	80.6	39	
12.0	....	17.6	....	25.8	....	37.9	....	55.6	....	81.6	....	43	
12.1	12.1	17.8	17.8	26.1	26.1	38.3	38.3	56.2	56.2	82.5	82.5	47	
12.3	....	18.0	....	26.4	....	38.8	....	56.9	....	83.5	....	51	
12.4	12.4	18.2	18.2	26.7	26.7	39.2	39.2	57.6	57.6	84.5	84.5	56	
12.6	....	18.4	....	27.1	....	39.7	....	58.3	....	85.6	....	62	
12.7	12.7	18.7	18.7	27.4	27.4	40.2	40.2	59.0	59.0	86.6	86.6	68	
12.9	....	18.9	....	27.7	....	40.7	....	59.7	....	87.6	....	75	
13.0	13.0	19.1	19.1	28.0	28.0	41.2	41.2	60.4	60.4	88.7	88.7	82	
13.2	....	19.3	....	28.4	....	41.7	....	61.2	....	89.8	....	91	
13.3	13.3	19.6	19.6	28.7	28.7	42.2	42.2	61.9	61.9	90.9	90.9		
13.5	....	19.8	....	29.1	....	42.7	....	62.6	....	92.0	....		
13.7	13.7	20.0	20.0	29.4	29.4	43.2	43.2	63.4	63.4	93.1	93.1		
13.8	....	20.3	....	29.8	....	43.7	....	64.2	....	94.2	....		
14.0	14.0	20.5	20.5	30.1	30.1	44.2	44.2	64.9	64.9	95.3	95.3		
14.2	....	20.8	....	30.5	....	44.8	....	65.7	....	96.5	....		
14.3	14.3	21.0	21.0	30.9	30.9	45.3	45.3	66.5	66.5	97.6	97.6		
14.5	....	21.3	....	31.2	....	45.9	....	67.3	....	98.8	....		

Standard resistance values are obtained from the decade table by multiplying by powers of 10. As an example, 13.3 can represent 13.3 ohms, 133 ohms, 1.33K, 13.3K, 133K, 1.33 megohms.

EIA Color Code

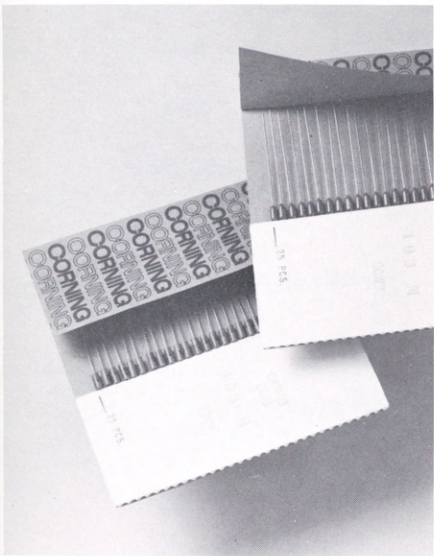
Significant Figures	Multiplier (number of zeros to follow)	Tolerance
Black = 0    Green = 5	Black = None    Yellow = 0000	Brown = ± 1%
Brown = 1    Blue = 6	Brown = 0    Green = 00000	Red = ± 2%
Red = 2    Violet = 7	Red = 00    Blue = 000000	Gold = ± 5%
Orange = 3    Grey = 8	Orange = 000    Gold = X .1	Silver = ± 10%
Yellow = 4    White = 9	Silver = X .01	No Band = ± 20%

STANDARD REEL PACKAGING



TYPICAL STYLES	QUANTITY PER REEL		PITCH	TAPE SPACING
	MIN.	MAX.		
CAC02, CK12, CKR11	500	3000	.200	2.086 ± .063"
CAC03, CK13, CKR12	500	3000	.200	2.086 ± .063"
CAC04	500	3000	.200	2.086 ± .063"
CAC05, CK14, CKR14	500	2500	.200	2.086 ± .063"

CORNING MATCHPACK



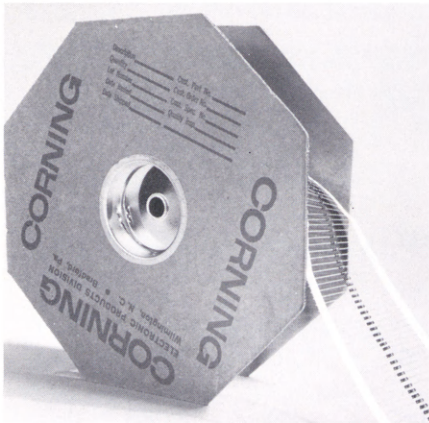
TYPICAL STYLES	PACKAGE QUANTITIES	
	STRIP	BOX
CAC02, CK12, CKR11	25	500
CAC03, CK13, CKR12	25	500
CAC04	25	500
CAC05, CK14, CKR14	25	500
CK31, CKR31	25	500
CK32, CKR32	25	500

OTHER PACKAGING OPTIONS

PRODUCT STYLE	PACKAGE
CY, CYR, CYFR	Best package to afford the parts physical protection during inspection, handling, and shipping
CK12, CK13, CK14	Strip Pack
CKR11, CKR12, CKR14	Strip Pack
CK/CKR31, CK/CKR32	Blister Pack
Solid Tantalums	Plastic Vials

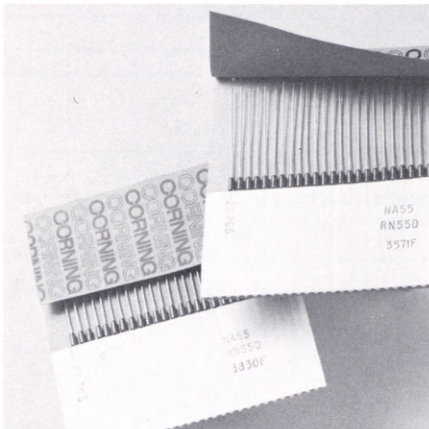


## STANDARD REEL PACKAGING



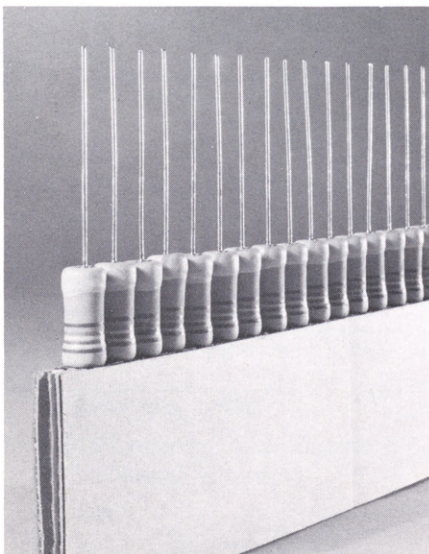
TYPICAL STYLES	QUANTITY PER REEL		PITCH	TAPE SPACING
	MIN.	MAX.		
C3, C05, RLR05, RN50	500	5000	.200	$2\frac{1}{16} \pm \frac{3}{32}$
FP55, FP $\frac{1}{4}$ , RN55, RNC55, RL07, RLR07, L04, FL4	500	5000	.200	$2\frac{1}{16} \pm \frac{3}{32}$
FP60, FP $\frac{1}{2}$ , RN60, RNC60, RL20, RLR20, L05, FL5	500	3000	.200	$2\frac{1}{16} \pm \frac{3}{32}$

## CORNING MATCHPACK



TYPICAL STYLES	PACKAGE QUANTITIES	
	STRIP	BOX
C3, C05, RLR05, RN50	25	500
RN55, RNC55, RL07, RLR07, L04, FL4	25	500
RN60, RNC60, RL20, RLR20, L05, FL5	25	250/500

## STRIP PACK



TYPICAL STYLES	PACKAGE QUANTITIES	
	NO. OF PIECES PER STRIP	NO. OF STRIPS PER BOX
RN60, RL20, FP60, FP $\frac{1}{2}$	40	25
RL32, FP1, RN65	34	10
RL42, FP2	25	10
FP3	25	10
FP4	25	10
FP5	25	10
FP7, FP10	25	10
FP67	25	10
FP69	34	10

OTHER PACKAGING OPTIONS . . . Available on request.



